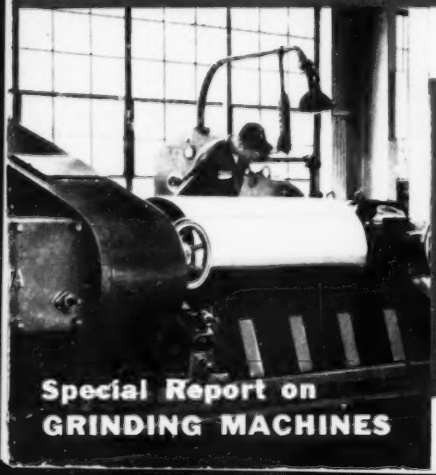
Machine and Tool BLUE BOOK

ESTABLISHED 1906



Special Report on GRINDING MACHINES

AUGUST 1953

Furnace Brazing, part 2

Screw Machines Increase Production

Modern Roll Grinding

Last Minute Washington News

"Know-How" Reference Sheets

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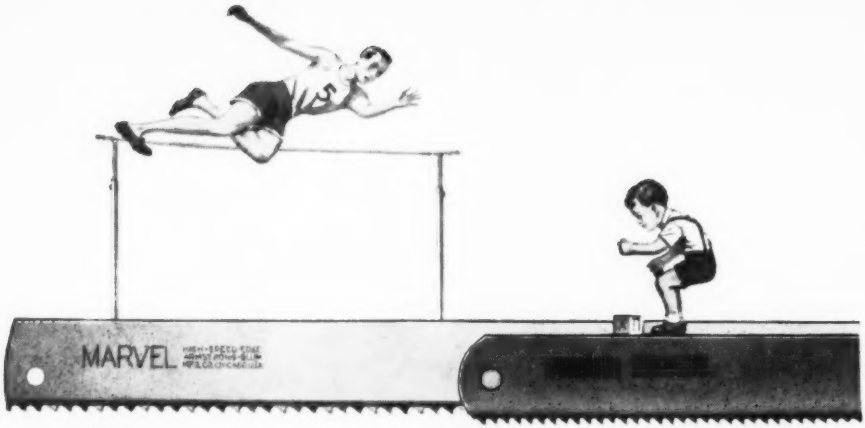

. . . but

Experience Cannot be Copied

More than a quarter-century ago MARVEL invented and basically patented the MARVEL High-Speed-Edge Hack Saw Blade—the UNBREAKABLE blade that increased hack sawing efficiency many-fold.

Every MARVEL Hack Saw Blade ever sold has been of that basic welded high-speed-edge construction, with constant improvements from year to year, as EXPERIENCE augmented the "know-how" . . .

MARVEL is not "tied" to any single source of steel supply, and has always used the best high speed steels that became available from time to time as metallurgy progressed. When-as-and-if finer steels are developed—and are proven commercially practical for welded-edge hack saw blades—MARVEL will use them, regardless of cost or source . . .

There is only one genuine MARVEL High-Speed-Edge! All other "composite" or "welded-edge" hack saw blades are merely flattering attempts to imitate—without the "know-how" of MARVEL EXPERIENCE . . .

Insist upon *genuine* MARVEL High-Speed-Edge when buying hack saw blades—and be SAFE, for you can depend upon MARVEL. They have been "tested", "pre-tested", and "re-tested" by thousands of users for more than a quarter-century!

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MARVEL SAWS
Better Machines—Better Blades

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Do it BETTER, FASTER, FOR LESS with

MULTIPRESS®

Multipress offers maximum advantages of hydraulic power — *rapid action, wide adjustability, and accurate control* — in eight frame sizes that meet an unusually wide range of production needs.

Ram speed, maximum tonnage, and stroke length are quickly adjustable to changing needs. Stroke can be set for either distance or pressure limits. Choice of controls includes hand lever, push-button, foot-pedal, automatic cycling, and manual or electric dual-safety controls. Denison's exclusive "Vibratory Ram Action" is available to solve problems of air escapement from dies, density control, or uniform compaction.

Standard Multipress accessories offer extra speed and efficiency on many operations. These include Index Tables, Dial Feed Tables, a Harmonic Feed for coil stock, preform equipment, straightening fixtures, foil marking equipment and other specialized accessory tooling.

TOUCH CONTROL—Multipress is now available with "Touch Control". In *exact split-second relation* to the way the operator moves or presses the hand lever, this slave-type control causes the ram to start, stop, speed up, slow down, reverse or exert pressure. Pressure applied to the work can be varied at the user's option.

SELECT THE FEATURES THAT FIT YOUR JOB

SPECIFICATIONS		BENCH MODELS				FLOOR MODELS				
Frame Size		B	D	F	G	H	K	L	N	Q
Capacities (Tons)		1	2,3,4,6	2,4,8	5,10	5,10,15	25	35	50	75
Max. Ram Speeds (I.P.M.)	Closing	1100	1300	1300	700	700	530	530	290	210
	Pressing	400	570	570	220	280	250	250	145	110
	Opening	600	920	920	310	500	470	470	290	220
Max. Stroke		6"	12"	12"	12"	12"	15"	15"	15"	15"
Max. Daylight Open'g		15⅜"	12"	18"	24"	23"	24"	24"	24"	30"
Throat Depth		5"	6"	8⅛"	12"	10"	12"	12"	12"	10"

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Do you require CLOSE TOLERANCES

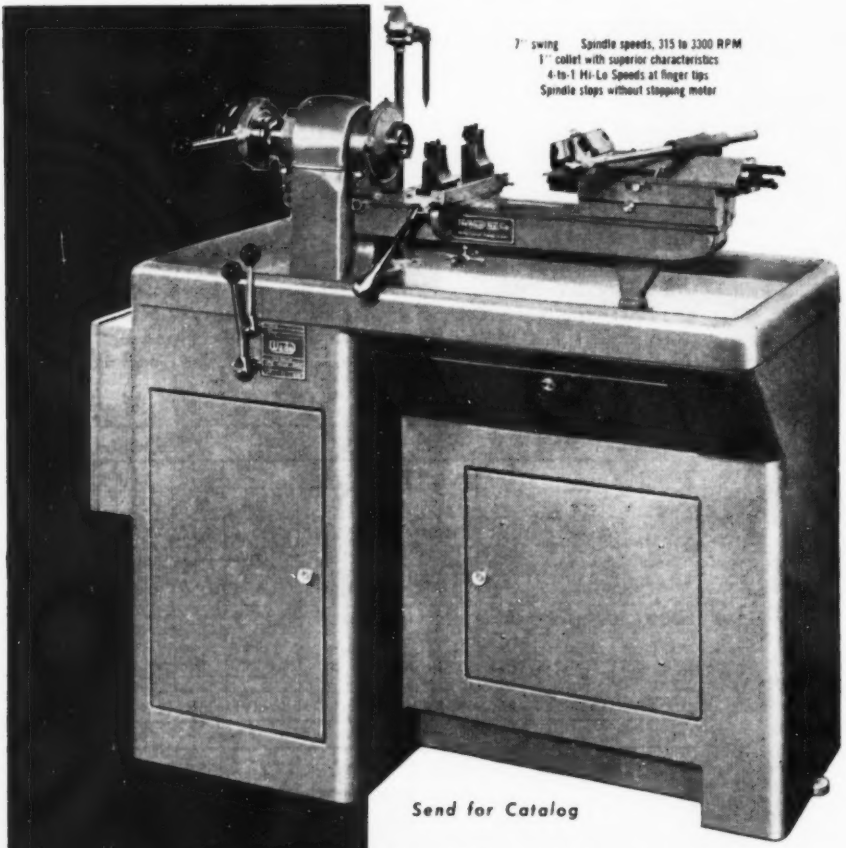
and fast production on your SECOND OPERATION WORK?

You will get it . . . and more . . . with the No. 7. HAND SCREW MACHINE

Wade®

It is especially designed for economical operation on production runs because of these features:

- Cut-away case-hardened steel tool blocks permit the operator to get tools closer to the nose of the spindle to hold closer tolerances.
- Quick-acting collet closer makes easy and speedy chucking, and fast removal of work.
- Wide range of spindle speeds.


7" swing Spindle speeds, 315 to 3300 RPM
1" collet with superior characteristics
4-to-1 Hi-Lo Speeds at finger tips
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Available in Five Sizes:
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. . . . . and HARDINGE tempered steel collets assure you of quick release, sustained accuracy and durability.

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Choose Your Wrenches as you do your friends--for life

Specify ARMSTRONG Wrenches for lifetime service, for finely balanced tools that feel right in the hand and make work easier, faster and less fatiguing. ARMSTRONG Wrenches generally are longer for size—give greater leverage. Accurately milled or broached openings give the proper clearance. They are safe wrenches because they are strong beyond need.

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5208 W. ARMSTRONG AVENUE CHICAGO 30, ILL.

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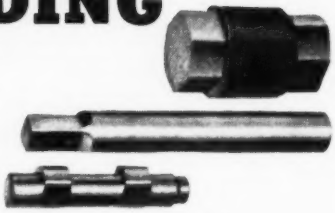

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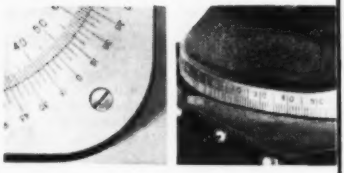
We are also equipped to machine graduations on dials of all types in small lot or production quantities.



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WHEN YOU USE *Mac-it*® YOU GET PEAK PERFORMANCE

STRENGTH WITHOUT BULK—Exceptional tensile and torsional strength of Mac-it screws permits use of lower cost, smaller screws.

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Manufactured by Mac-it Parts Co., Lancaster, Pa.

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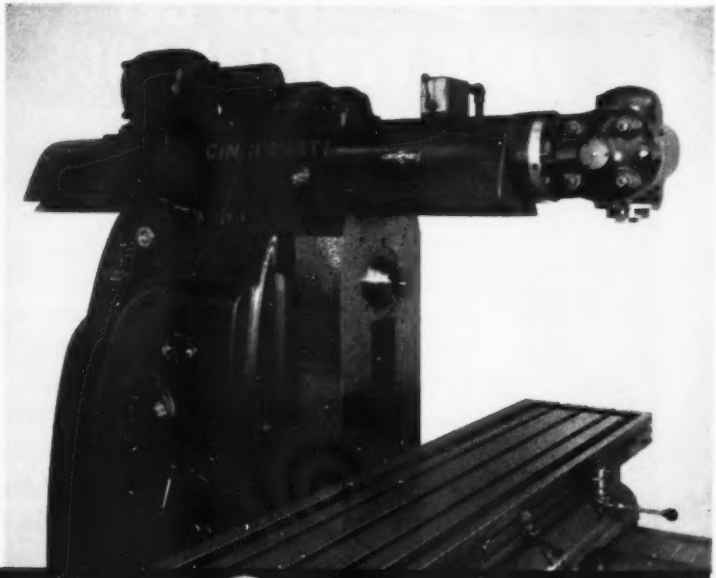
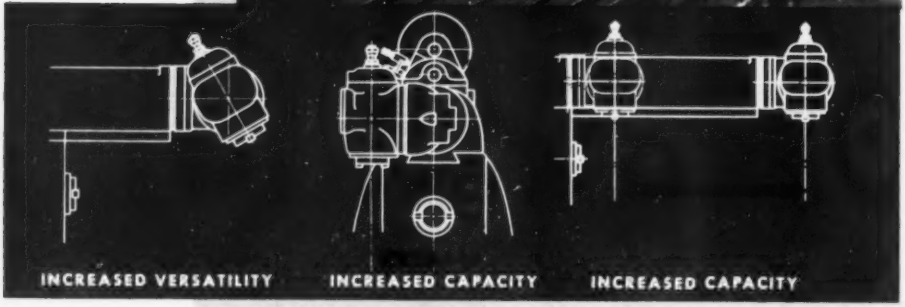
600% INCREASE

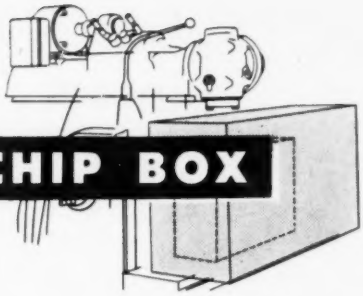


CINCINNATI No. 5 Plain High Power Dial Type Miller equipped with Motor Driven Universal Milling Overarm Attachment.



CINCINNATI

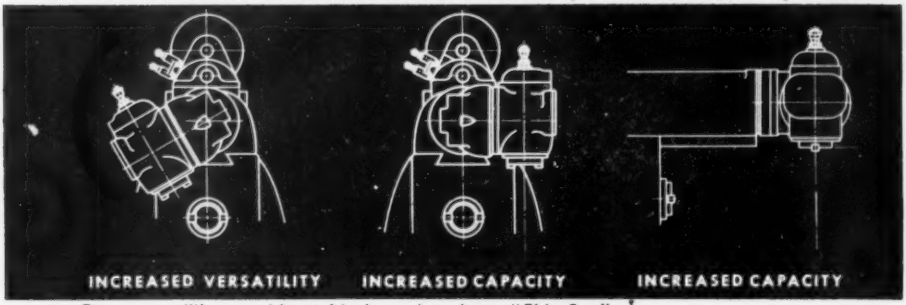
Color box indicates increased cutting range which can be obtained on a CINCINNATI No. 2MI Milling Machine by replacing the overarm with a Motor Driven Universal Milling Overarm Attachment.



IN VOLUME OF *CHIP BOX

"I could do that job if my machines had a little more range and versatility." This familiar statement indicates a condition that can be changed readily on your CINCINNATI Knee-Type Milling Machines by simply equipping them with Motor Driven Overarm Attachments. Compared to a conventional setup, where position of the cutter is not changed on the arbor, the attachment increases volume of *Chip Box 400% to 600%. ¶ This type of attachment is a self-contained motor driven unit mounted in the standard overarm ways. All advantages of the CINCINNATI overarm construction are retained, and there is no interference whatever for conventional setups. ¶ A few examples of the ways in which CINCINNATI Motor Driven Overarm Attachments increase the range and versatility of CINCINNATI Milling Machines are illustrated here. There are two sizes of these attachments: 2 hp for No. 2ML, Nos. 2 and 3MI and Dial Types; 5 hp for Dial Types and High Power and Dual Power Dial Types. You may obtain more information by writing for publication No. M-1661-1.

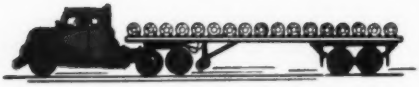
THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO



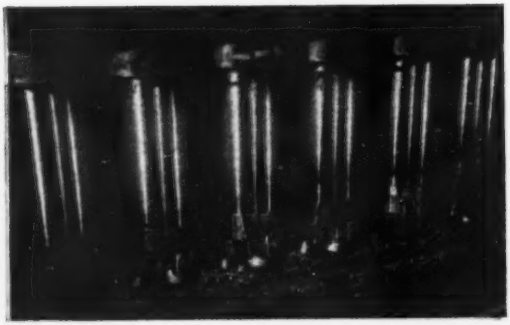
*On every milling machine table is an imaginary "Chip Box" in which chips can be cut throughout its entire volume.

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

OUNCES OF WESSONMETAL CEMENTED CARBIDE!



TONS OF PRODUCTION!



ACTUAL JOB

Farm Implement Mfg. Co.

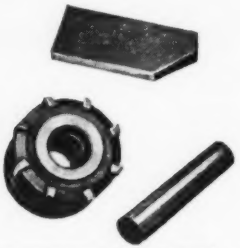
Machine	Ingersoll Boring Mill—6 spindle
Part	Cylinder block
Operation	Rough cylinder bore
Tools	3 R.H. and 3 L.H. Wesson Fine Pitch Cutters—3.480 dia.—12 Wessonmetal Solid GI Blades
Speed	148 S.F.M.
Stock Removal	3/16"
Feed	10" per min.—.063 per revolution
Length of Cut	8⅞"

OVER 300% DOLLAR SAVINGS PER TOOL

OLD METHOD		NEW WESSON METHOD	
Pieces per Grind	836	Pieces per Grind	3160
Cost of Tool	$49.68	Cost of Tool	$172.80
Grinding Cost per sharpening	$11.70	Grinding Cost per Sharpening	$8.78
Tool Cost per 100 Pieces	$2.588	Tool Cost per 100 Pieces	$0.642

On only one machine with Wesson Tools Savings of over $900 per year

HOW IS YOUR PRODUCTION SCORE CARD!



Write today for folder on Wesson's educational, full color, sound movie—"This Carbide Age."

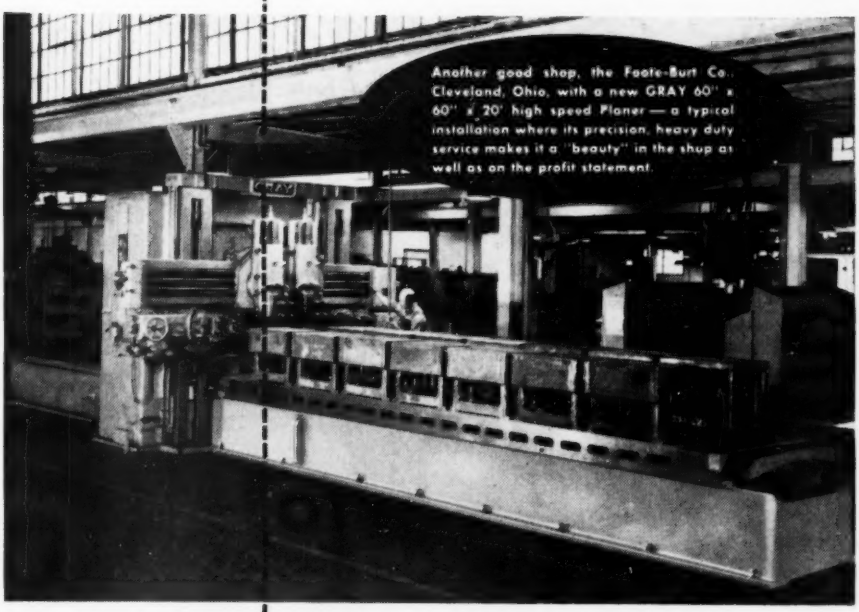
WESSONMETAL Cemented Carbide

WESSON METAL CORPORATION

LEXINGTON, KENTUCKY

Affiliated with WESSON COMPANY, Detroit, Mich.

the sign of a good shop



Another good shop, the Foote-Burt Co., Cleveland, Ohio, with a new GRAY 60" x 60" x 20' high speed Planer — a typical installation where its precision, heavy duty service makes it a "beauty" in the shop as well as on the profit statement.

a new **GRAY** planer

. . . recognized by machine shops throughout the world as the ultimate in planers. Built for high production with great precision, combining more original engineering developments and production features than any other planer . . . it is in such demand that GRAY is the largest planer builder.

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FAST CARBIDE TOOL GRINDING

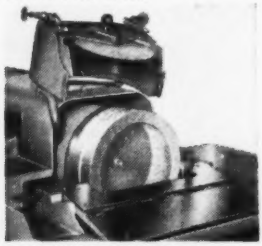
For Fast Grinding of Carbide and High Speed Tools,

HAMMOND 14" GRINDERS

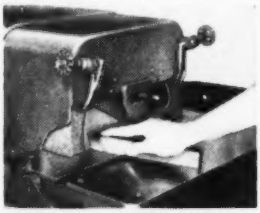
are the Choice of America's Leading Manufacturers . . .

MODEL 14-WD
Wet or Dry

NO SPRAY—NO SPLASH (Patented) Swivel guard closes one side of wheel while other is in use, permitting freedom of movement and unobstructed vision.



EASY WHEEL CHANGE, by removing two cap screws and raising Wheel Hood on top, allowing easy access to wheel. Spout connections do not require disconnecting.



SAFETY CUP WHEEL DISC (Patented) closes cup of wheel, preventing hand injuries or dropping tools into cup of wheel.

Note these PLUS FEATURES . . .

- Two operators can grind tools with freedom of movement
- "No Spray—No Splash" guards (Patented)
- Safety cup wheel disc (Patented), prevents dropping tools into wheel cup
- Easy and quick wheel change
- Tables adjust "in and out" by hand crank to compensate for wheel wear
- Wet or dry—or CO_2 carbon dioxide
- Oversize, ball bearing, precision spindle with multi-V-belt drive
- Heavy machine tool construction—net weight 2250 lbs.

There are over 6000 Hammond Carbide Grinders in service! Write for Catalog No. 225 showing America's most complete line of Carbide Tool, Chip Breaker and Diamond Finishing Grinders.

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It's 3 to 1 a Jarvis TORQOMATIC can do your tapping jobs better

AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS

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TAPPING ATTACHMENTS
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A complete range of Jarvis Torqomatics — available to fit any type drill press or tapping machine.

You'll like their trouble-free performance — their ability to produce quality threads — their increase in tapped holes per hour, the savings in taps — and their ease of operation!

We invite your inquiries about these highly efficient Jarvis Torqomatics that have outmoded all other slow, expensive and highly perishable machines of the past.

Jarvis Torqomatics are priced low enough to make it economically possible to replace your old tapping devices and attachments.

A Jarvis representative will be glad to consult with you — no obligation.

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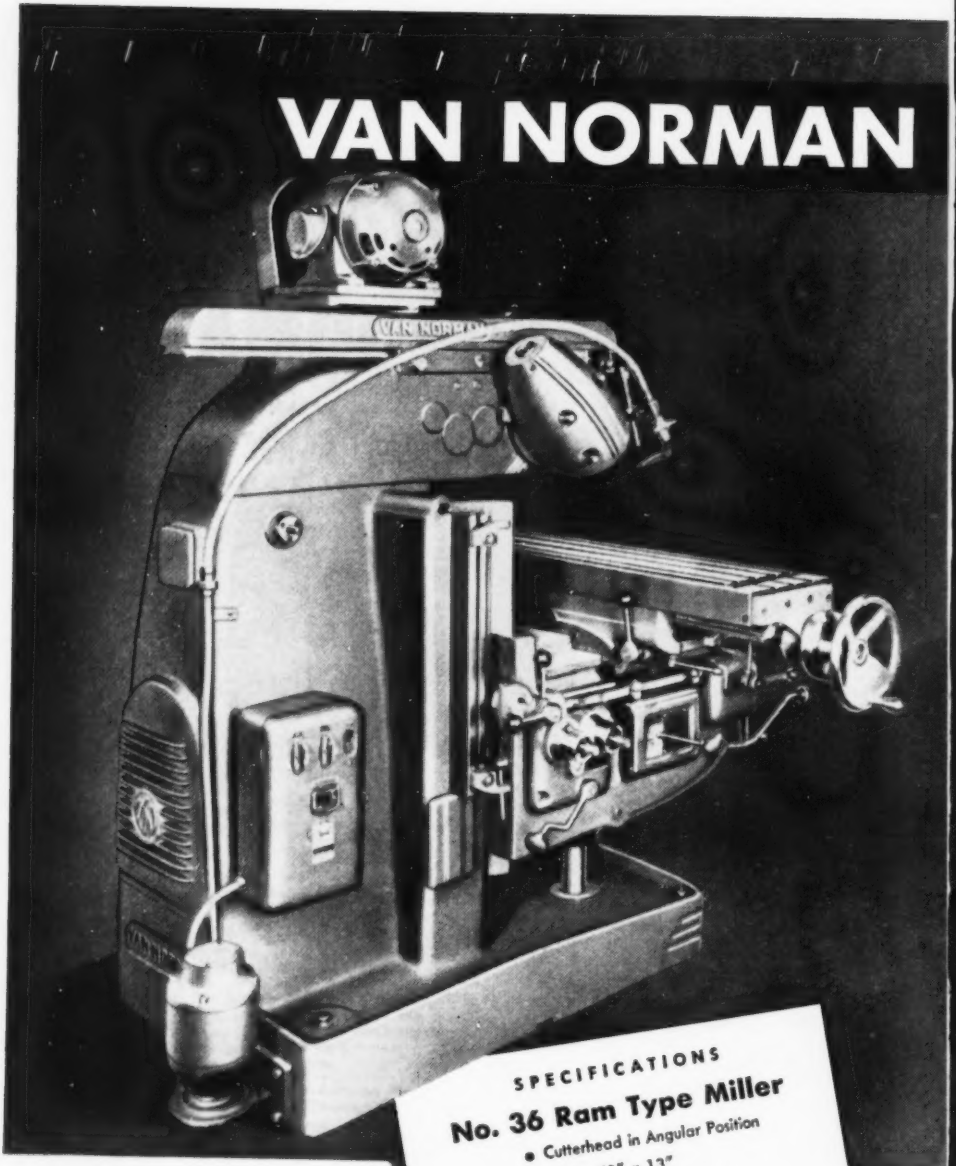
SPECIFY YOUR NEW DRILL PRESS BE JARVIS TORQOMATIC EQUIPPED

THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

VAN NORMAN



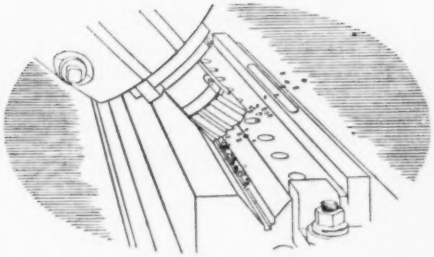
SPECIFICATIONS

No. 36 Ram Type Miller

- Cutterhead in Angular Position
- Table: 58" x 13"
- 18 Speeds: 30 to 1500
- 18 Feeds: 3/8 to 32

Ram-Type Millers

TAKE A
GOOD CUT
in Milling Production Costs!



Adjustable Cutterhead Plus Movable Ram, Saddle Cross and Knee Vertical Feeds Increase Work Range • Reduce Costs

Van Norman Ram Type Millers embody many outstanding features which provide for faster, more economical milling in the tool room, pattern shop, die and mold shop, experimental laboratory and production line.

The combined adjustments of the cutterhead and ram movement permits conventional horizontal, vertical as well as angular milling on one machine. With Van Norman Millers, most non-productive time is eliminated, production is increased, while costs are reduced.

EASY TO OPERATE . . . Front and Rear control of operation (all millers from 22L and up) power and manual feeds, six-way rapid traverse.

WIDE RANGE OF USE . . . Adjustable Cutterhead — 90° adjustment from horizontal to vertical.

POWER AND RIGIDITY . . . Heavy-duty heat treated gear transmissions; massive cutterhead and ram; rugged column; large knee, saddle and table assemblies.

LONG LIFE . . . Automatic lubrication; antifriction bearings, multi-splined shafts. Large diameter feed screws.

Investigate Van Norman Ram Type Millers. There's a size available to meet your particular requirements. Write for information

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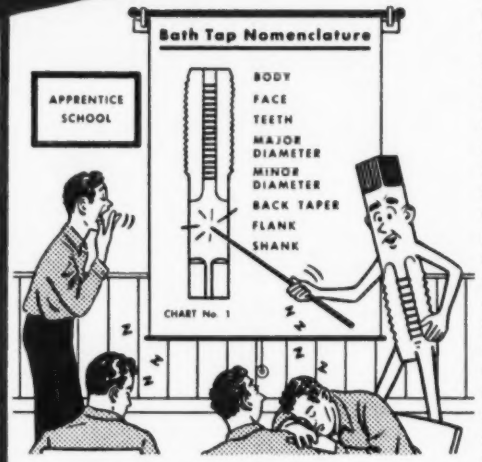
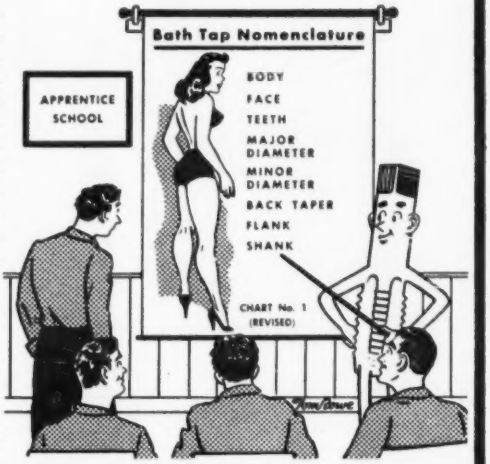
SPRINGFIELD 7, MASSACHUSETTS, U. S. A.

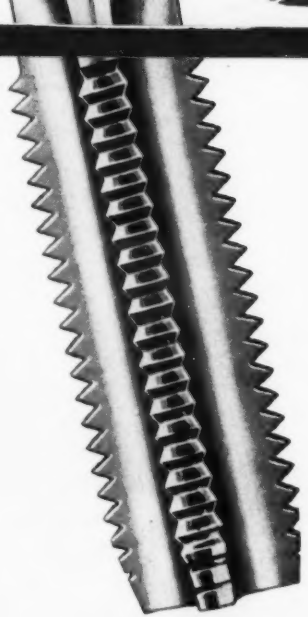
TAP-ODDITIES



Pete taught his apprentices
Bath Tap nomenclature.
Quite frequently there came a lull —
'Til Pete dreamed up a cure.



The name's the same — and on this frame
Even the dumbest schmo,
Can find each part on the human chart
Where the pointer ought to go.



Tap nomenclature is important, but it is the manufacturing perfection in such things as chamfer, pitch, hook, rake, thread angles and other important characteristics, that make Bath ground thread Taps so effective and economical.

More is demanded of taps than almost any other cutting tool. They are expected to operate under confined chip space, lack of lubrication and other adverse conditions. That's why more consideration should be given to expected tap performance.

Instead of buying taps – it's the final cost per threaded hole that counts.

Analyze the job – make your Bath Tap selection in accord with the thread to be cut, the metal to be worked, tolerance required and tapping machine to be used – or, give this information to Bath engineers for their recommendation. They can help you get more threads per dollar – show you how to get Better Threads with Bath Taps.

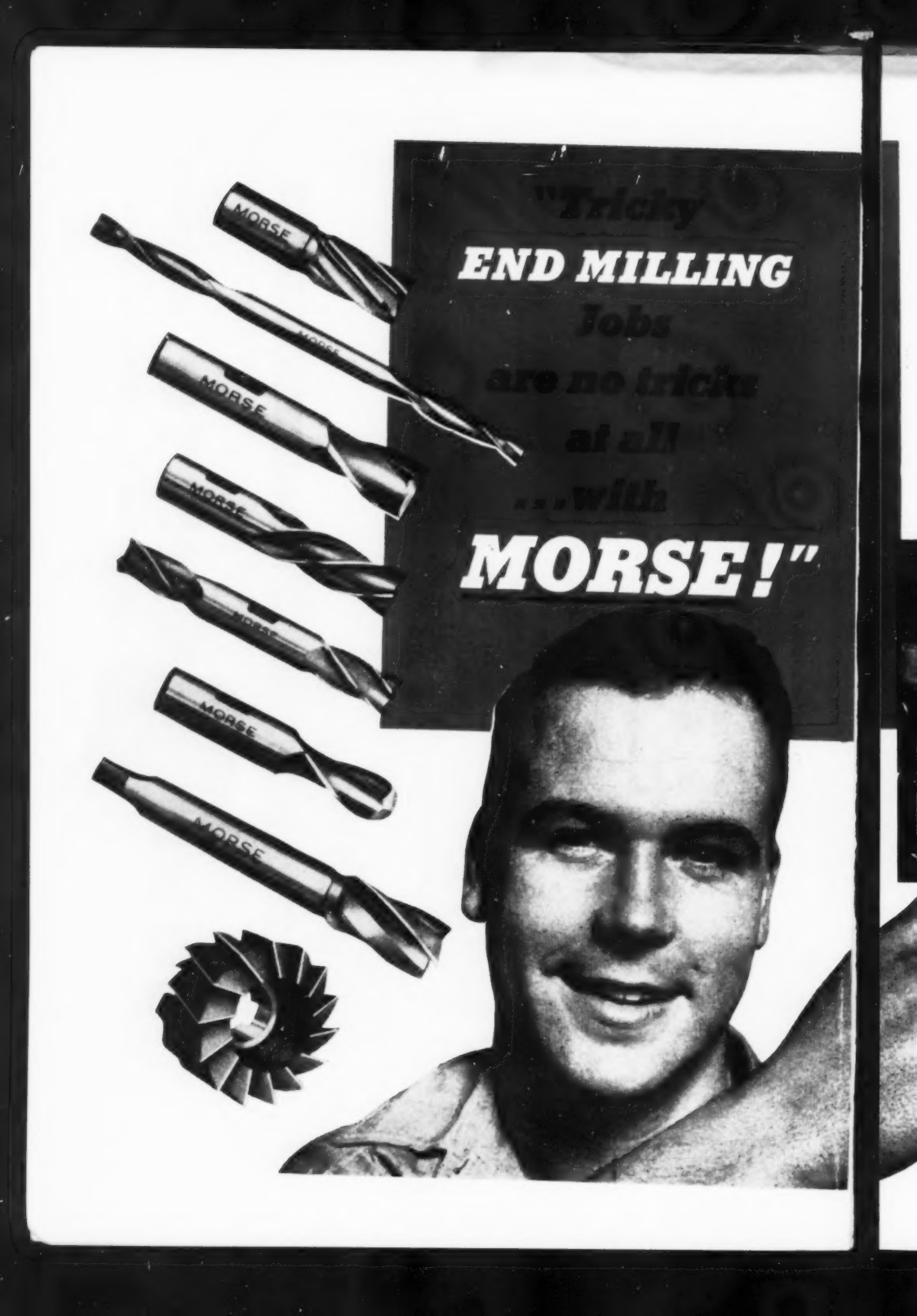
INSIST ON BATH TAPS
– PROFIT BY THEIR
PLUS – PERFORMANCE

JOHN BATH CO. INC · WORCESTER · MASS

PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

JOHN BATH CO. INCORPORATED

14 Grafton St., Worcester, Mass.


"Tricky
END MILLING
Jobs
are no tricks
at all
...with
MORSE!"
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MORSE

A lot of *standard* Morse End Mills would be specials in anybody else's catalog!

Want them short and stubby, or long and lean? Or with ball-end for die cavities, fillets, and round-bottomed holes and slots? Or with *left*-hand spiral but *right*-hand cut to push chips ahead? Morse makes all these, *and more*

For instance, Morse also makes them with two flutes, cleared to cut to center for plunge-cutting . . . with taper shanks to fit machine spindles . . . and in shell types for face or slab milling cuts. Not to mention a complete size-range in the exclusive shear-cutting design known as Morse Hi-Helix.

So if you want an end to your end-mill problems, get hold of your Morse-Franchised Distributor. He has every type you could possibly need . . . and he knows how to engineer it to your job. *Call him now.*

MORSE TWIST DRILL & MACHINE COMPANY

NEW BEDFORD, MASSACHUSETTS

(Division of VAN NORMAN CO.)

Warehouses in New York, Chicago, Detroit, Houston, San Francisco

MORSE

Cutting Tools

Buy them by phone from your Morse-Franchised Distributor and save ordering time

ACCURATE AT ANY ANGLE

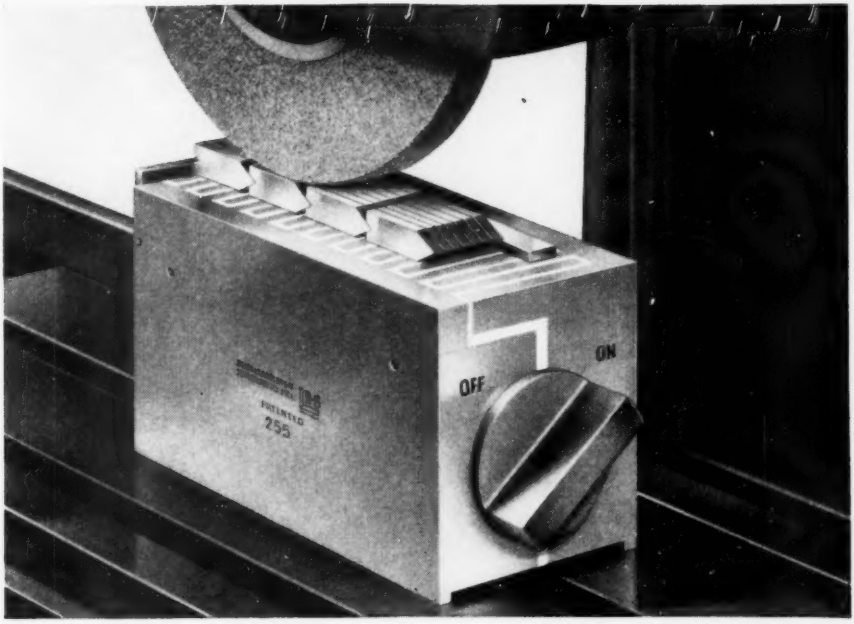
UNIVERSAL MILLING HEAD

Rugged, compact design and precision manufacturing combine to make the TREE Universal Milling Attachment accurate for milling, drilling or boring . . . **at any angle.** Heavy duty spindle enables ¾" collet capacity. Automatic collet closer. Power feed. Eight spindle speeds. Hardened and ground spindle and quill. Enclosed micrometer depth stop.

Write for free literature describing the MH-4 Milling Head illustrated, the TREE Taper Boring Tool, the 2UV Vertical Mill and other quality TREE Tools. . .

EXPORT ADDRESS: States Trading Co., 401 Brdwy., New York 13, Cable Address; "STRADESO"

TREE TOOL AND DIE WORKS
1600 JUNCTION AVENUE RACINE, WISCONSIN



Holding power that never fails

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A POWERFUL MAGNETIC GRIP holds work securely on Brown & Sharpe Permanent Magnet Chucks — even when plant power fails. No electric current is used . . . no danger of short-circuited wires or heating. Turn of control handle engages or releases powerful magnetic field of permanent magnets. Completely self-contained and portable for use throughout the shop.

Rectangular Models in 8 sizes from 2 7/16" x 5 1/4" to 12 1/8" x 36"; Rotary Models in 5", 7" and 9" dia.

For sale only in the United States of America and its Territories. Write for Catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

BUY THROUGH YOUR LOCAL DISTRIBUTOR

Brown & Sharpe B·S

HERE'S THE TOOL *that fits to a* "T"

STYLE PTL

STYLE PTR

STYLE PTN

The right angle chucking lathe, tracer controlled, provides for efficient profile machining of workpieces having large diameter, short length, and thin wall sections, particularly those made of stainless steel and heat-resistant alloys.

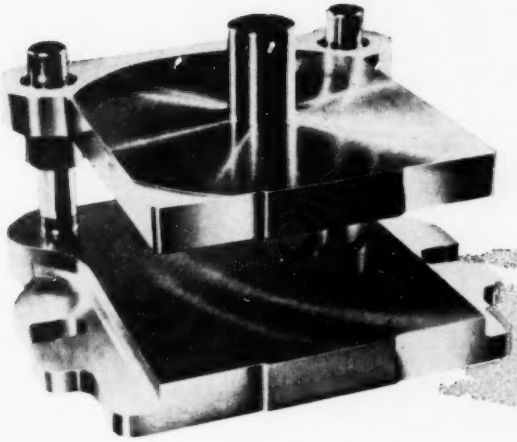
To complete the set-up, an appropriate cutting tool is required. It must be so shaped as to accurately follow the lead of automatic control, face up to the job, and cut corners with maintained precision.

For this very purpose a Kennametal tool has been designed. The mechanically-held triangular insert, seated in a hardened V trough, provides a sturdy design in a 50° nose angle tool that will withstand lateral thrust, and can be modified to smaller nose angles and radii as required by specific profiling conditions.

Four shank sizes are available in three different styles—righthand, lefthand, and neutral, as illustrated in the sketches. See Catalog 52, page 45 for specifications. Confer with our Tool Engineers if you need help in this type of tooling—or any other. Kennametal Inc., Latrobe, Pa.

KENNAMETAL

CEMENTED CARBIDE TOOLING
THAT INCREASES PRODUCTIVITY

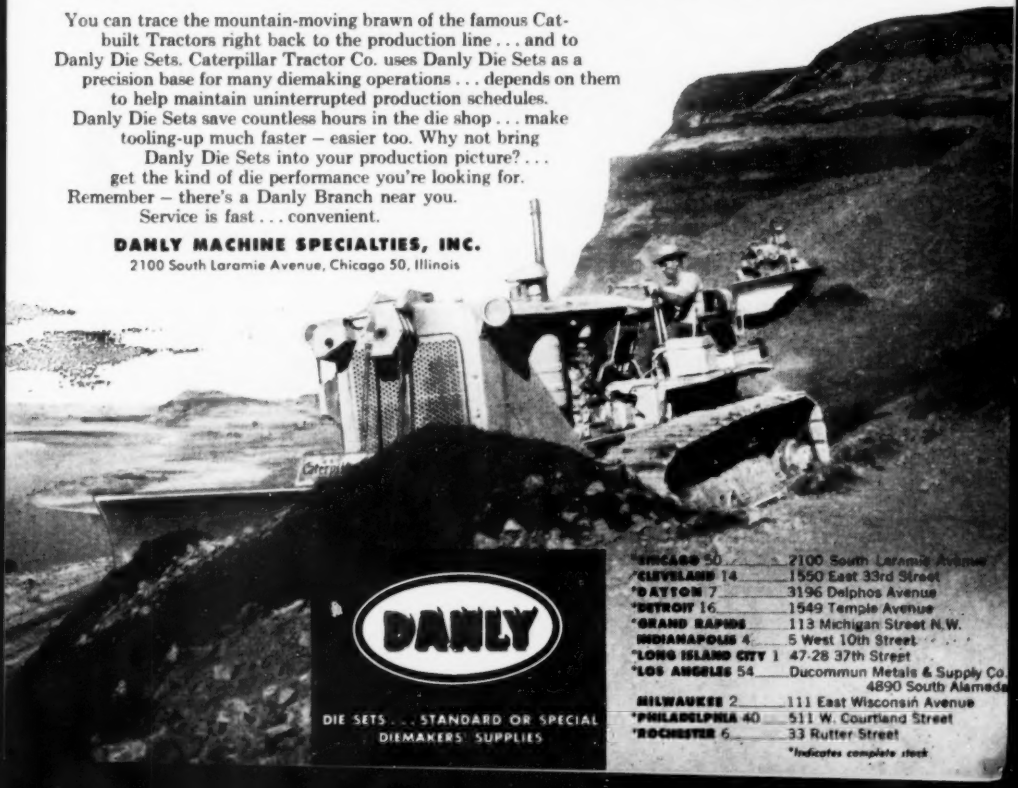


DANLY DIE SETS

help build the mighty Cat Diesel Tractor

You can trace the mountain-moving brawn of the famous Cat-built Tractors right back to the production line . . . and to Danly Die Sets. Caterpillar Tractor Co. uses Danly Die Sets as a precision base for many diemaking operations . . . depends on them to help maintain uninterrupted production schedules. Danly Die Sets save countless hours in the die shop . . . make tooling-up much faster – easier too. Why not bring Danly Die Sets into your production picture? . . . get the kind of die performance you're looking for. Remember – there's a Danly Branch near you. Service is fast . . . convenient.

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Illinois



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DIE SETS . . . STANDARD OR SPECIAL
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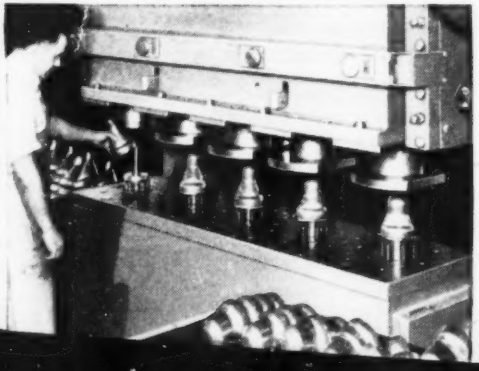
MILWAUKEE 2	111 East Wisconsin Avenue
*PHILADELPHIA 40	511 W. Courtland Street
*ROCHESTER 6	33 Rutter Street

*Indicates complete stock

NIAGARA

SERIES B
GAP FRAME Double Crank Presses

Niagara B-4 x 72 Press at the General Machine Works in Los Angeles. It is shown here fitted with two dies for forming operations on an automatic deflector.



The same press as shown above arranged with dies for redrawing projectile parts in 5 steps. Shells are transferred manually from die to die.

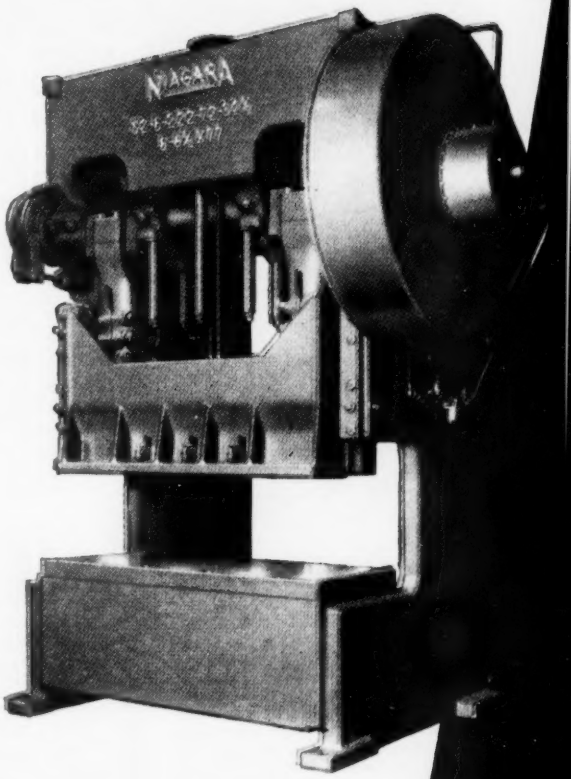
NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

Manufacturers of a complete line of sheet metal working equipment ranging from small hand tools up to large power operated machinery.

Versatility and High Production

- Gap frame convenience with double crank width.
- Ideal for long progressive dies or multi-station dies.
- Rear of press open for full accessibility.
- One piece welded steel frame for maximum rigidity and long die life.
- Exclusive Niagara Sleeve Clutches for maximum productive strokes per minute and minimum maintenance cost.
- Niagara cushions for drawing operations.
- Automatic feeds for high production jobs.

Write for Bulletin



Niagara B-6½ x 77 Gap Frame Double Crank Press. Air actuated, electrically controlled sleeve clutch with friction clutch convenience and sleeve clutch economy. Air releasing brake. Clutch and gearing operating in a bath of oil. Air counterbalance for slide with surge tank over-size cylinder and pressure regulating valve to compensate for various weights of dies. Cross bar knockout in slide. V-belt motor drive.

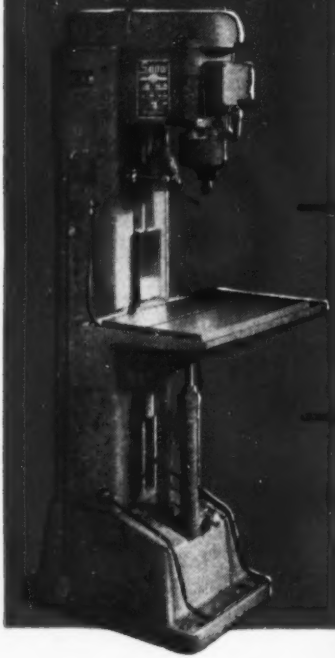
DISTRICT OFFICES: NEW YORK • CLEVELAND • DETROIT • PHILADELPHIA

SNOW

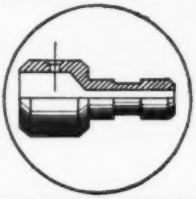
FULL UNIVERSAL MACHINES

Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:

For Top Production



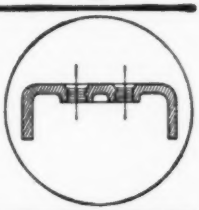
DRILLING



Crossdrill and C"T" Sink 1/16" Hole

Material—Brass
Production—4800 per hour
Fixture—#15 Vertical index
Equipment—#1-UD Drilling Machine

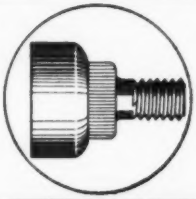
TAPPING



Tap Two #10-32 Holes

Material—Steel stamping
Production—3800 tapped holes per hour
Fixture—#14 horizontal index
Equipment—#1-UT tapping machine

THREADING



3/8"—24 Thread—1/2" Long

Material—Die Cast Aluminum
Production—2500 per hour
Fixture—#10 Drum dial
Equipment—#3-TR Threading machine

Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures. All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production.

Sensitivity of power application prevents tool breakage.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

SNOW

MANUFACTURING COMPANY

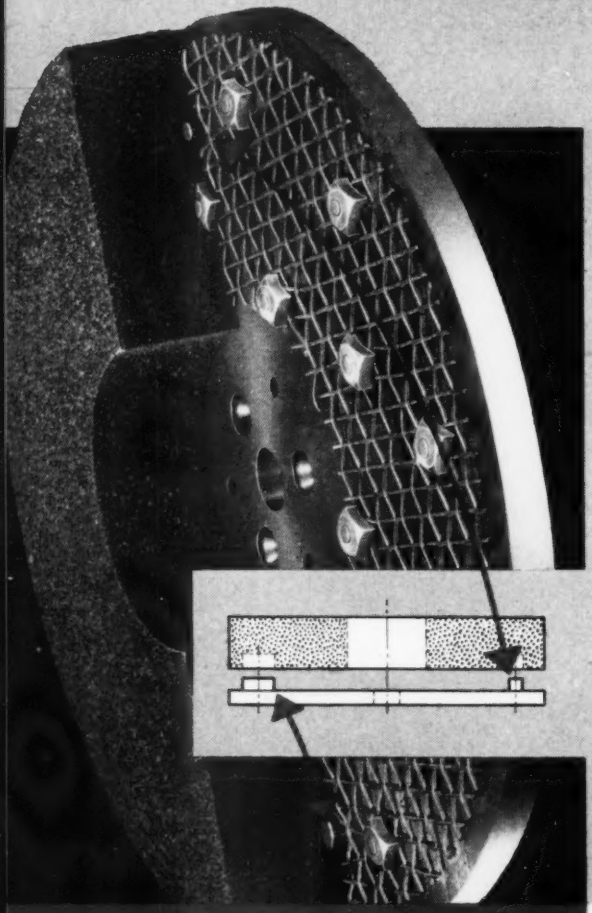
435 Eastern Ave., Bellwood, Illinois
(Chicago Suburb)

Single Spindle Verticals • Two-Spindle Verticals • Two-Spindle Horizontals • Automatic Nut Tapping Machines • Drill Press Tap Heads • Automatic & Semi-Automatic Jigs & Fixtures

Submit Sample Parts for Production & Cost Estimates

Compare the Grinding Precision

of This Abrasive Disc With Other Makes



Grinding to close tolerances is no problem with Gardner abrasives. Precision work is made easier because factory trueness is maintained throughout the entire life of the disc.

On Gardner discs provided with the Tru-Lok feature, it's impossible to make an off center mounting. On job after job maintaining trueness assures better finishes and closer tolerances. Doweled Tru-Lok mounting aligns the holes in the abrasive and the steel wheel.

This exclusive Gardner feature is another reason why Gardner Abrasive Discs are first choice among users of flat surface grinders. New Gardner grinders are equipped with the Tru-Lok feature. It can also be made available for older machines.

Gardner engineers abrasive discs to fit specific grinding requirements. For help with your surface grinding problems, call the nearest representative in our nation-wide service organization.

GARDNER

abrasive discs

Publicity Department
GARDNER MACHINE COMPANY
Beloit, Wisconsin 107AS

Please send me the Gardner Guidebook for Surface Grinding.

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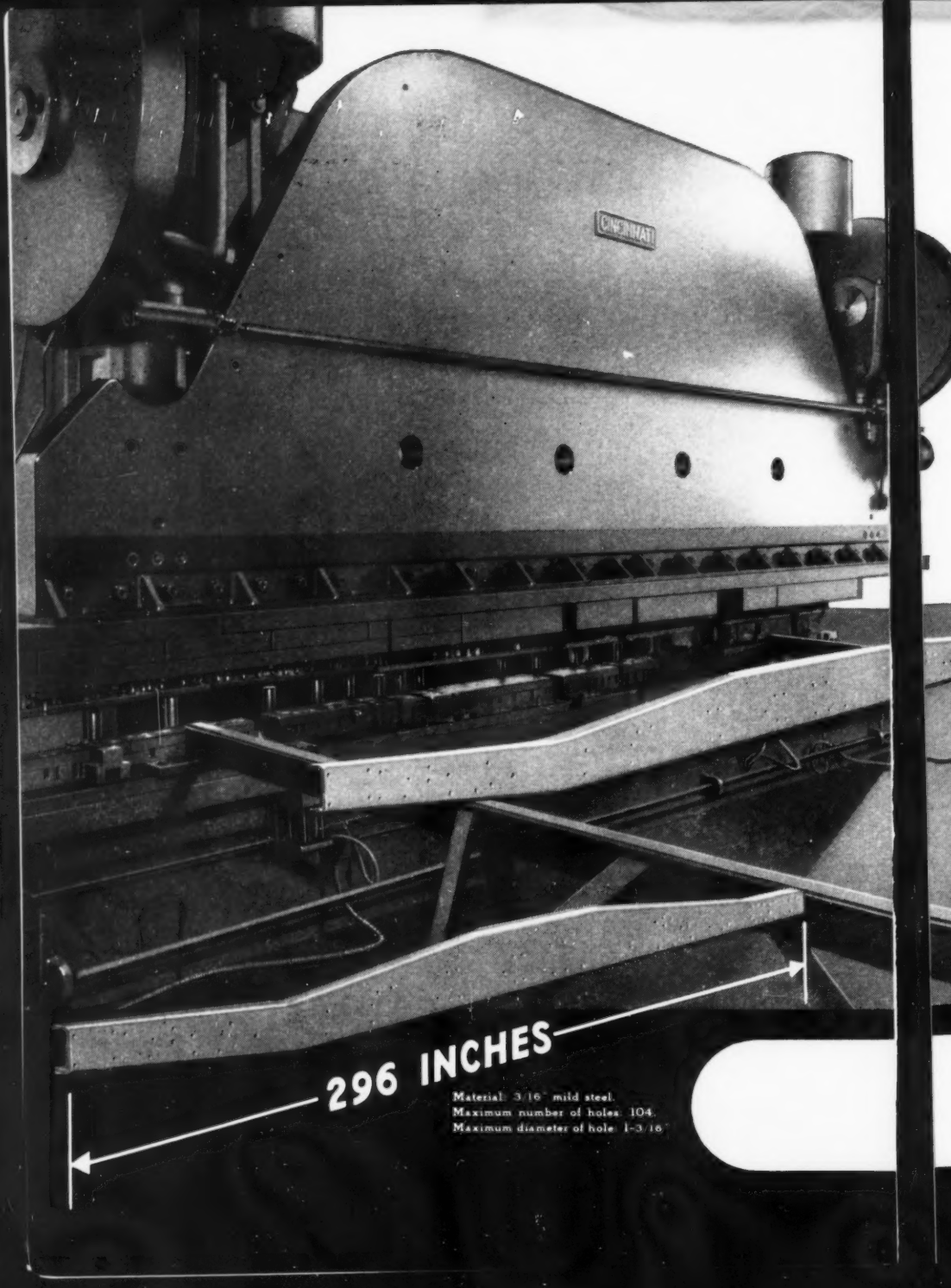

Material: 3/16" mild steel.
Maximum number of holes: 104.
Maximum diameter of hole: 1-3/16"

PUNCHING

104 holes every 10 seconds *accurately*

The multiple punching of these holes must be very rapid, and their location as well as spacing must be held accurately.

The assembly of these 24' trailer frames is smooth and economical with no costly hand fitting.

With this punching equipment, position, size and spacing of holes may be changed quickly and at low cost.

The Brake can perform many other operations as desired . . . converting from one operation to another quickly and at low cost.

Write for the New comprehensive Catalog B-4.

Photo—Courtesy Youngstown Steel Car Corporation.

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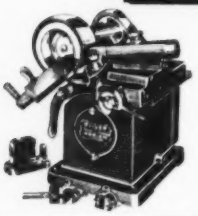
CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

CINCINNATI

Long On Efficiency . . .
Long On Accuracy . . .
Long Life . . .

OLIVER DRILL POINTERS



If you want better performance from your drills you will find that machine grinding them on Oliver Drill Pointers gives faster cutting, more accuracy and longer life to your drill points than by any other method.

OLIVER of ADRIAN

best for drill sharpening

Oliver Drill Pointers give balanced cut with each lip doing equal work — eliminating the excessive drill costs and imperfect holes usually traced to improper drill point grinding. Increase the wearing life of your twist drills by removing them at the first signs of dullness — and replace them in your machines after sharpening on Oliver Drill Pointers.

No. 510 for drills ¼" to 3"—2-3-4 flute. Variable clearances. Variable point angles. Automatic operation.

No. 21 Oliver Bench Grinder. Hand operated for Drills No. 57 to ½". Right hand, with an improved point. Attachments are available for grinding oil hole drills, left hand and other special points.

Write for our free Booklet
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See our catalog in Sweet's Directory

MACHINE TOOLS by OLIVER include:
AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS
DRILL POINT THINNERS
TEMPLATE TOOL GRINDERS
FACE MILL GRINDERS
DIE MAKING MACHINES

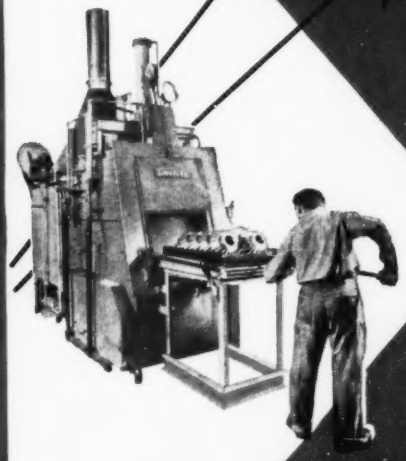
OLIVER INSTRUMENT CO.

1408 E. MAUMEE · ADRIAN, MICHIGAN

5 FURNACES IN ONE

the *Lindberg* Carbonitriding Furnace

Yes, it's many furnaces in one! It's designed not only for carbonitriding . . but also for hardening, carburizing and carbon restoration. It's self contained . . it's easy to maintain!



10 reasons why Lindberg Carbonitriding Furnaces are better

1. Heating is by new type, gas-fired, vertical radiant tubes. They weigh only 29 pounds each . . can be changed in two minutes.
2. Vertical radiant tubes last longer . . often two or three times as long.
3. Quench tank is built-in . . no costly excavation or piping necessary.
4. Quench tank has fin type oil cooler . . maintains oil at proper temperature.
5. Specially designed chamber purges work before it enters heating chamber.
6. Special check-light system tells you where charge is at any given time.
7. Control of heating and quenching cycle is automatic.
8. Lindberg Carbonitriding Furnaces are made for automatic, semi-automatic, or manual charging.
9. Lindberg Carbonitriding Furnaces have been tested under three years of rough operating conditions.
10. Lindberg "Hyen" generators which supply atmosphere for Lindberg Carbonitriding Furnaces are instantly adjustable for many different types of atmospheres.

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DIAL THESE BEST NUMBERS FOR MODERN FINISHING

54 BL
For faster finishing action on all metals.

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For finishing action on sharp burrs and edges.

70 BL
Wide range of finishing action on all metals.

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General finishing action on all metals.

120 BL
Wide finishing range on medium-hard and soft metals; high polish on hard metals.

FINE-TEX
Polishing, finishing and burring soft metals; cleaning medium-hard and hard metals.

SEE—SAVE—PROFIT— *from Brightboy's almost unbelievable action!* This working combination of *special-texture, cushioning rubber and formula-matched abrasive* gives you a completely fresh concept of finishing—many, many applications beyond the limits of other methods.

You get smooth, fast finishing of stainless steels, forged aluminum, hard metals and all others—and plastics, wood, glass, laminated materials. You can BURR, CLEAN, FINISH, POLISH, IN ONE OPERATION.

A TEST SOLVES YOUR PROBLEMS. Ask your dealer for the Brightboy sample card and Catalog-Manual. Write us if he cannot supply you, or on any problems where finishing is involved.

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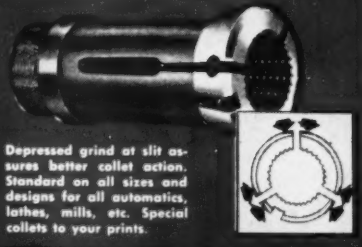
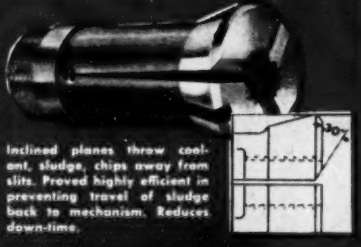
ALL SHEFFER STANDARD COLLETS HAVE SHEFFER CLOVER-LEAF GRIND



Depressed grind at slit assures better collet action. Standard on all sizes and designs for all automatics, lathes, mills, etc. Special collets to your prints.

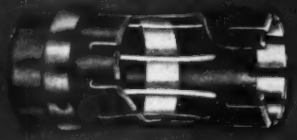
ONLY SHEFFER BUILDS THE SHEFFER SELF-CLEANING COLLET*



Inclined planes throw coolant, sludge, chips away from slits. Proved highly efficient in preventing travel of sludge back to mechanism. Reduces down-time.

SHEFFER PRODUCTS ARE BEST

SHEFFER "ECONOMY" PUSHER* GIVES MORE PIECES PER BAR



Dual bearings for positive grip with less pressure. Gives more pieces per bar. Available in solid bronze for soft finished surfaces. Also conventional and "squirrel cage" pushers.

SHEFFER DIAPHRAGM CHUCK STEPS UP GRIPPING POWER 8 TIMES*

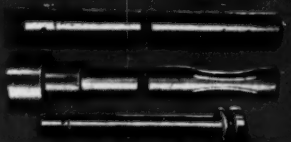
Simple booster mechanism multiplies air thrust. Permits stiffer diaphragm giving tighter jaw grip and wider application. Repeats to extreme accuracy. Designs for special applications.

SHEFFER "BB" PUSHER HAS* SIMPLE ONE-PIECE INSERT

Single insert holds stock in most cases to full rated capacity. Reduces stress and wear. Easy to stock and assemble. Made in several materials. Also available with 3-piece pads.

Patent applied for

SHEFFER HAS COMPLETE LINE OF SCREW MACHINE ACCESSORIES



Collet tubes and pushers, tubes with spools, etc., collet tube adjusting nuts, pusher tube bushings for all automatic screw machines.

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TRAVERSE CITY, MICH.

MEET THE DEMAND FOR PRECISION WITH TOOLS THAT MAKE PRECISION EASY

Introducing
a major
advance in
coolant lubricants
SHEAR SPEED
soluble oil
SHEAR SPEED
CHEMICAL PRODUCTS

A single multi-viscosity blend for all these:

Drilling	Reaming	Piercing
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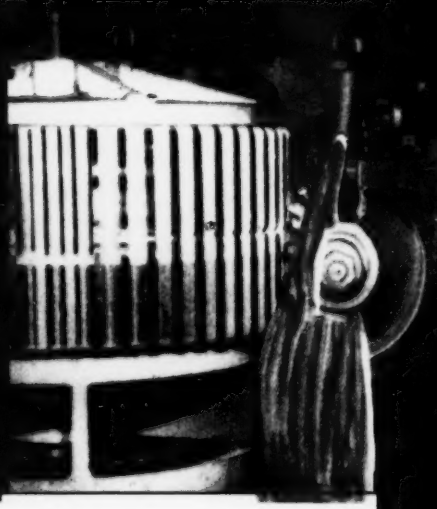
Broaching	Threading	Rolling
Turning	Forming	Generating
Gear Cutting	Sawing	Planing
Boring	Counter-boring	Shaping
Grinding	Chamfering	Thread Grinding
Cut-off	Deep-drilling	

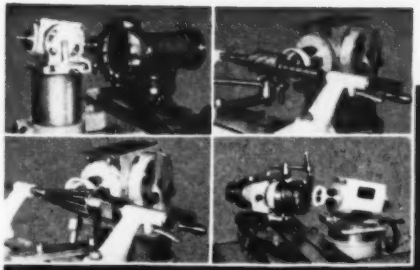
a universal
soluble oil
for machining,
grinding and
press work



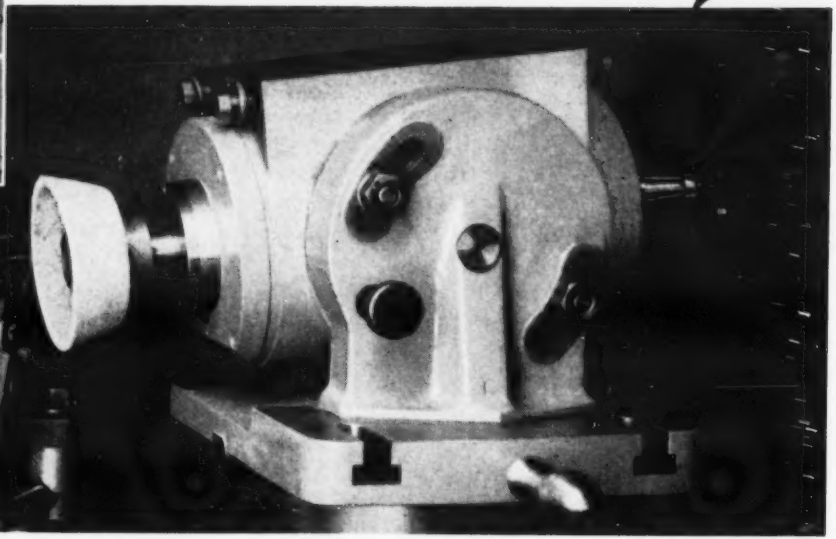
with these versatile Features:

- No rancidity or odor over long periods of use.
- Non-irritating, contains skin-soothing additive.
- Immune to low temperatures.
- Stable emulsion – no clogging, sludging, etc.
- Non-corrosive to ferrous and non-ferrous metals.
- Reduces eye strain.
- No heavy film deposit.
- No special mixing sequence.
- Rapid emulsification even with hardest waters.
- Anti-foaming and smoking.
- Better surface finishes.
- Dissipates heat rapidly.
- Minimizes grinding wheel loading.
- Quick separation of fines and chips.
- Greater lubricity – high film strength.
- Low cost – shipped as concentrate.

Now YOU can do MORE JOBS with just ONE cutting fluid. For the complete story on this amazing new discovery, write today for Bulletin SO-53.



The TOOL GRINDER For *You!*



The Modern POPE Super Precision 1 HP, 3600 RPM Motorized Tool and Cutter Grinder Head With

Angular Adjustment

In A Vertical Plane

This new unit is super-precision throughout... It is designed particularly for replacement of tool grinder heads which do not have the extremely useful angular adjustment in a vertical plane.

It will more than pay for itself — reduces set-up time — makes wheels cut faster — spark out quicker — produces the kind of cutting edge on your tools that stands up and cuts longer.

Pope Motorized Grinder Heads are available for most makes of cutter and tool grinders. Ask for quotation to cover your grinder.

No. 92

Specify **POPE®** PRECISION SPINDLES

POPE MACHINERY CORPORATION

Established 1920

261 RIVER STREET · HAVERHILL, MASSACHUSETTS

for Enlarging Holes in Metals

Frequently it is necessary to enlarge holes in castings, steel forgings or punched metals. Hercules High Speed Three and Four Flute Core Drills are specifically designed and heat treated to proper hardness for efficiently enlarging cored, drilled or punched holes. Taper shank core drills are available in diameters from ¼" to 3" and straight shank core drills from ¼" to 2" diameters.

Just off the presses is a new catalog covering the complete W & B line of Drills, Reamers, Countersinks, Counterbores, Carbide Tools, Tool Bits and Special Tools. Write today on your letterhead for your free copy of this attractive and extremely usable tool catalog.

W&B

Contact Your Local W & B Distributor

"Makers of Fine Tools Since 1848"

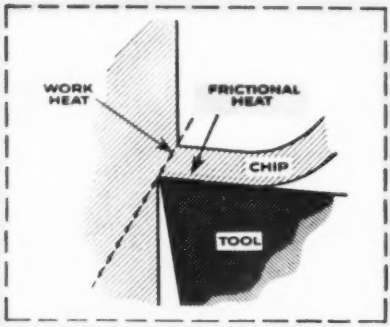
WHITMAN & BARNES

PLYMOUTH, MICHIGAN

NEW YORK • CHICAGO • LOS ANGELES • HOUSTON

JOHNSON'S WAX-COOL ATTACKS FRICTIONAL HEAT

New water-soluble coolant effectively lubricates at tool-chip interface.



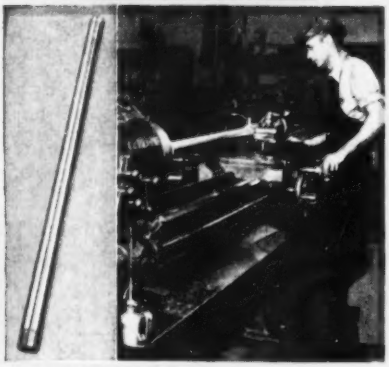
1. WAX-COOL stays with tools and material even at temperatures up to 450°F. and pressures to 200,000 P.S.I.

2. WAX-COOL prevents chip weld because work runs cooler.

3. WAX-COOL effectively minimizes frictional heat which is by far the principal source of heat.

Because of the greater lubricity of certain waxes and their high polar attraction for metal, Wax-Cool is the first coolant to greatly reduce frictional heat at the tool-chip interface. Wax-Cool also has the heat carry-off properties of ordinary coolants – to check work heat generated in the shearing zone.

HERE IS PROOF!



Wax-Cool is being used effectively on this tough job at the E. J. Longyear Company, Minneapolis. They are turning down the external surface of a 4'6" length of #2320 steel tubing. One rough and one finish cut. On a 15-piece run it took 3 days with 4 pieces of scrap, and a poor finish. With Wax-Cool the job was done in 2 days with no scrap and a mirror finish. They used to cut half-way and reverse the tube in the lathe. Now they cut its full length for a straight, accurate cut. Call your Johnson distributor for an on-the-job test, or write:

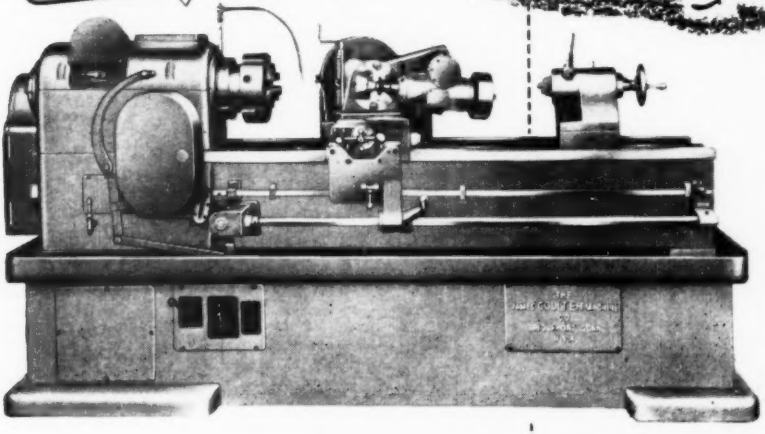
Industrial Products Dept. MTB-8
S. C. Johnson & Son, Inc., Racine, Wisconsin

Ask about Wax-Cut—wax-type cutting *oil* for automatic screw machines, gear cutting machines, etc.

Ask about Wax-Draw—wax lubricant for drawing and forming all types of metals.

FASTER AUTOMATIC PRECISION THREADING

The only answer to high cost production blues!



Get set to sing a happy tune, for **COULTER** can help you banish those *"labor shortage/reject/poor production of threaded part/blues"*.

The **COULTER** "Threadmaster" (shown above) is one thread milling machine that can produce long and short precision traversing, elevating, crossfeed and lead screws in less time with uncanny accuracy.

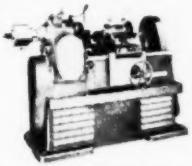
Investigate **COULTER AUTOMATIC THREADING MACHINES** today — change the "blues" to "cheers" — extract *every cent of profit* possible out of your plant and still maintain the high quality standards you demand.

IF YOU ARE CONFRONTED with a thread production problem, our engineers can help you. Literature available.

MACHINE TOOL BUILDERS SINCE 1896

The James Coulter Machine Co.

637 Railroad Ave. **Bridgeport 5, Conn.**



Model "H1" COULTER HOB THREADING MACHINE produces internal, external, right and left hand threads with precision — Faster — Accurately — AUTOMATICALLY.

Model "L1" COULTER THREADING LATHE produces precision, square, standard and 29 degree internal or external threads in various diameters and materials — Faster — Accurately — AUTOMATICALLY.

save hours and dollars

driving socket head screws and bolts

APEX DRIVERS
Male hex sizes to fit #5 to 1" socket head cap screws; #10 to 1" socket head set screws. Female square drives: ¼" to 1".

APEX POWER BITS
Male hex sizes to fit #5 to 1" socket head cap screws; #10 to 1" socket head set screws. Hexagon shank sizes: ¼", 5/16", 3/8", 3/8".

APEX INSERT BITS
Male hex sizes to fit #5 to ¾" socket head cap screws; #5 to ½" socket head set screws. Used with Apex bit holders, available for all popular makes of air, electric and spiral drivers.

You can save hours of production time—and dollars in production costs—using Apex tools to drive socket head screws and bolts. Use Apex drivers, power bits or bit holder and insert bit combinations with your power tools to eliminate expensive, time-consuming manual effort. These Apex tools, designed to do a specific job faster and more efficiently, can help increase your productive output.

For complete information, write (on your company letterhead, please) for Catalog 29 (Apex Drivers) or Catalog 21 (Apex Power Bits and Insert Bits).

APEX TOOLS

power bits, bit holders and insert bits

THE APEX MACHINE & TOOL COMPANY
1028 S. Patterson Blvd. • Dayton 2, Ohio

THE Hause Holomatic DRILL UNIT

is fully Automatic...

-yet WEIGHS ONLY 30 POUNDS!*

Capacity: 5/8" in Mild Steel

Air Actuated . . Hydraulic Feed

The new Model 14 Hause Holomatic Drill Unit is entirely powered by air and features hydraulic feed regulation for manual and automatic cycling. Feed rates are infinitely adjustable in both advance and retract motions. Positive stop . . . dwell . . . instantaneous retract . . . continuous cycle . . . jogging and skip drilling are easily achieved by simple adjustment for either automatic or manual operation. The Hause Holomatic can be mounted in horizontal, vertical or angular planes.

WRITE FOR THE NEW BROCHURE

* Approx.

Hause ENGINEERING

MONTPELIER, OHIO

High-Carbon, High-Chrome Construction

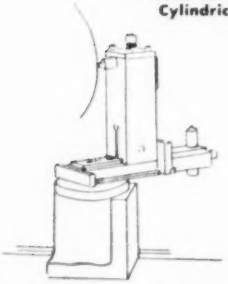
.0001" ACCURACY

Fluidmotion

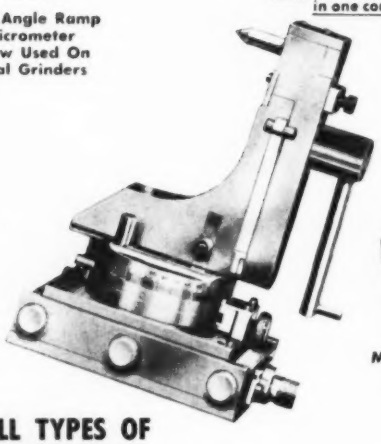
WHEEL DRESSERS

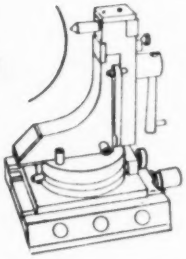
dress two angles tangent to a radius
in one continuous motion

New Solid Angle Ramp
With Micrometer
Lead Screw Used On
Cylindrical Grinders



Form-master Low Cost Angle
Or Radius Dresser



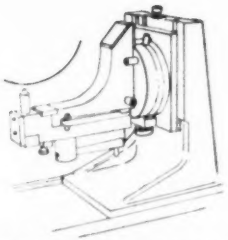


Model "REC" on Surface
Grinders up to 14"
Diameter Wheels

ADAPTABLE TO ALL TYPES OF CYLINDRICAL AND SURFACE GRINDERS

With the "Fluidmotion" Dresser, you can *dress* two angles *tangent* to a radius—using one handle *in one continuous motion*. Operation is so fast and simple that beginners can use them to boost your grinding machine out-put. Forms are always clean, precise—angles and radii "flow" into each other. Contours are consistently sharp, accurate to .0001", without tool or chatter marks.

J & S TOOL CO., INC.
647 W. Mt. Pleasant Ave., Livingston, N. J.
(N. J. Highway Route No. 10)



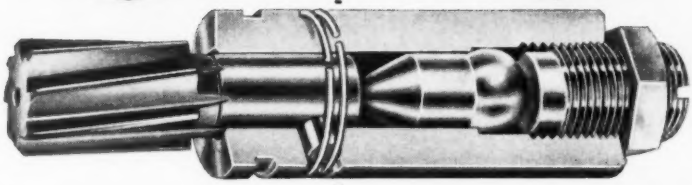
Under the wheel fixture with
micrometer feed for use on
surface grinders

J&S TOOL CO. INC.

A variety of models and attachments to suit your needs. Write for free catalog covering dressers in detail. J. & S. also manufactures a complete line of All-Purpose Jaw (machine) Clamps, Vises, and Special Tools. Write for Machine Shop "Time Savers" booklet.

PRATT & WHITNEY

STUB SCREW MACHINE REAMERS and FLOATING HOLDERS



FAST, FREE CUTTING . . . thanks to correct P&W design with left hand spiral cut and positive rake at the cutting edge.

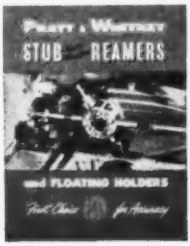
LONGER WEAR . . . distinctive P&W Special Surface Treatment gives superior resistance to chip abrasion. Smoother grinding finish provides maximum wear life.

SUPERIOR ACCURACY . . . Cutting Diameter, Shank Diameter and Chamfer are held to rigidly high standards of accuracy for both size and concentricity.

ELIMINATE INACCURACIES . . . The excellent design of these full-floating holders permits *true axial displacement* of the reamer. This effectively compensates for all minor inaccuracies in indexing or hole alignment and assures precision reaming without bellmouth. By using bushings, only five different holders are needed to accommodate the entire range of reamer shank sizes.

AVAILABLE . . . P&W Stub Reamers are quickly supplied in *any decimal size* from .060" to 1.010" because they're finished to your order from hardened blanks carried in stock.

For complete information, use the coupon to send for your free copy of Circular No. 552.



PRATT & WHITNEY

DIVISION NILES-BEMENT-POND COMPANY
22 Charter Oak Blvd., West Hartford 1, Connecticut
Please send my free copy of Circular No. 552.

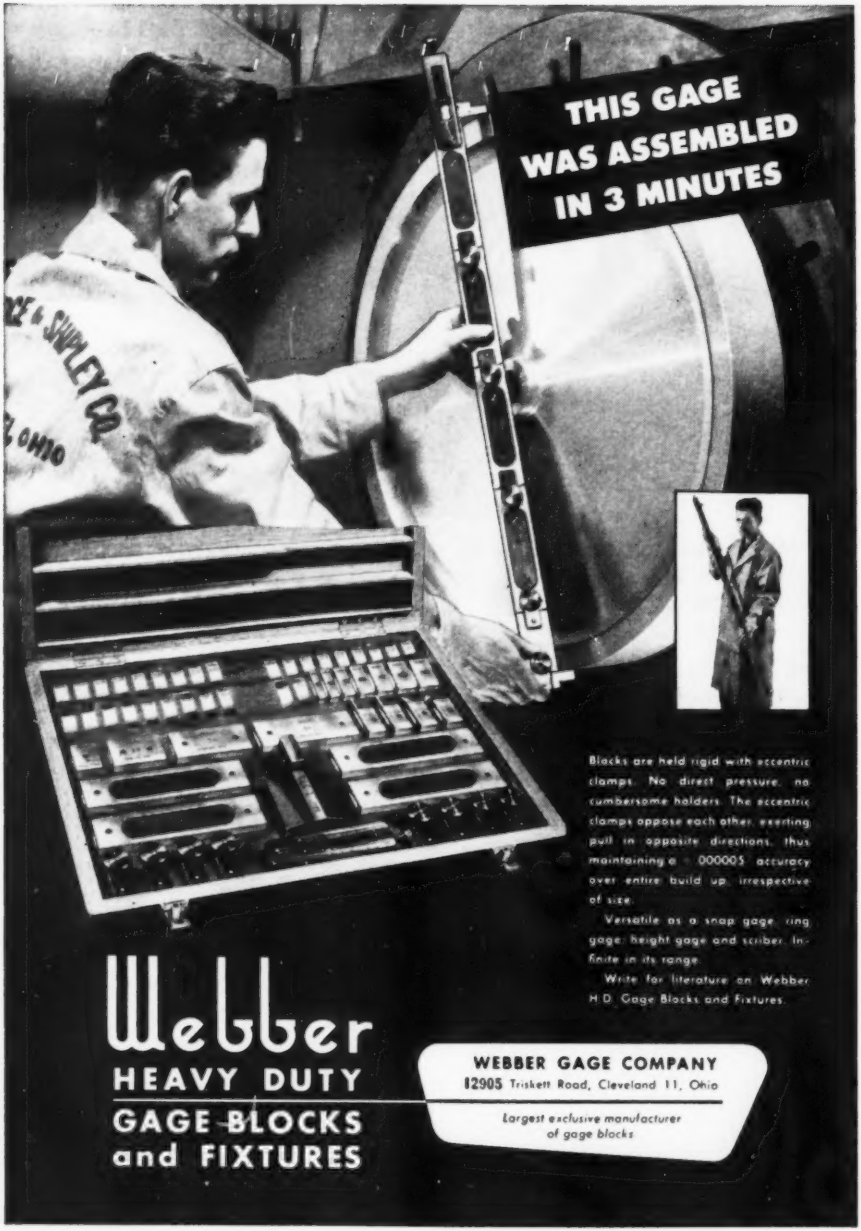
NAME_____

POSITION_____

COMPANY_____

CO. ADDRESS_____

CITY_____ **ZONE**____ **STATE**_____



Blocks are held rigid with eccentric clamps. No direct pressure, no cumbersome holders. The eccentric clamps oppose each other, exerting pull in opposite directions, thus maintaining a .000005 accuracy over entire build up, irrespective of size.

Versatile as a snap gage, ring gage, height gage and scriber. Infinite in its range.

Write for literature on Webber H.D. Gage Blocks and Fixtures.

Webber
HEAVY DUTY
GAGE BLOCKS
and FIXTURES

WEBBER GAGE COMPANY
12905 Triskett Road, Cleveland 11, Ohio

Largest exclusive manufacturer of gage blocks

Why wait? Perhaps the Job Can be Done on a Standard Machine with Kempsmith Attachments

You know—it's really surprising how many difficult milling operations can easily be handled by Kempsmith Standard Attachments mounted on a standard milling machine.

Manufacturers faced with urgent production schedules are utilizing Kempsmith Standard Attachments to help solve their milling problems. These precision-built accessories are made to perform the most delicate milling operations, with speed and accuracy. They frequently eliminate the need for special, single-purpose machines, at the same time reducing production costs to rock bottom.

Look to Kempsmith for milling machines, attachments, arbors and accessories. They are backed by more than 60 years specialized experience in this field.

Write for bulletins describing Kempsmith Standard Attachments, Arbors and Accessories

KEMPSMITH MACHINE CO., 1827 S. 71st St., Milwaukee 14, Wis., U.S.A.

KEMPSMITH

Precision Built Milling Machines Since 1882

A 5950-½I-C

ELGIN
MILLING MACHINES

TOOL ROOM PRECISION WITH PRODUCTION SPEED

. . . that's what you expect and get from Elgin Machine Tools. They are designed and built to tool room standards, to perform to close tool room tolerances . . . and with sturdiness permitting speed that fits right into production lines.

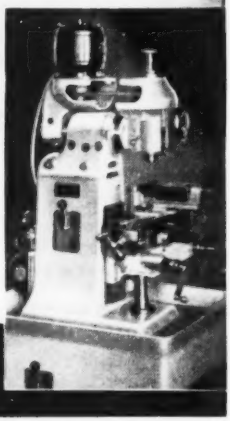
Elgin Lathes and Milling Machines are standard equipment in many tool rooms and shops where extreme accuracy is necessary.

HORIZONTAL MILLING MACHINE

Spindle of nickel steel, hardened and ground externally and internally, and fitted with pre-loaded ball bearings. Speeds, 85 to 2750 R. P. M. with Variable Speed Drive, directly reversible. Table, 4⅛" x 18" with longitudinal travel 12"; transverse, 6", vertical, 6". Two-speed motor, ¾-⅜ H. P.

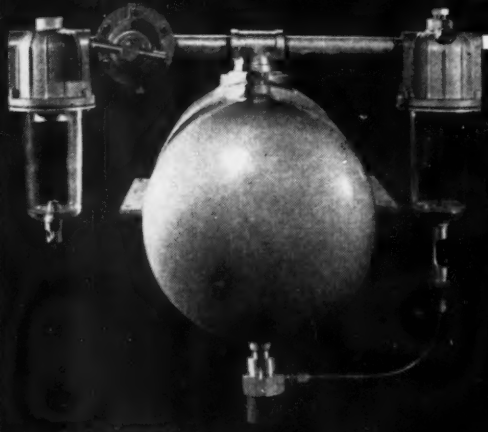
VERTICAL MILLING MACHINE

Spindle is nickel steel, hardened and ground both externally and internally, and fitted with pre-loaded ball bearings. Five speeds, 200, 700, 1250, 2250 and 4000 R. P. M. Vertical travel of spindle, 1¾". Table is 4⅛" x 18" with 12" longitudinal travel; transverse travel 6". Vertical table travel 7". Head swivels 90° each side of center.



ELGIN TOOL WORKS, INC.
1772 BERTEAU AVENUE CHICAGO 13, ILLINOIS

IT'S NEW... lo-jet acro*



the revolutionary new coolant system that...

keeps cutting tool and work at room temperatures!

lo-jet acro's *proven results in America's leading industries are making production history, from coast to coast!*

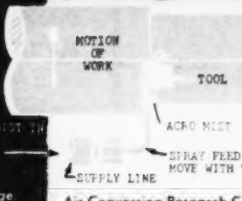
* Controlled compressed air operation for all types of metal cutting with special ACRO-COOLANT soluble solution.

Pictured here is the 8½" outlet centrifugal equalizer distributor with 8 copper tube spray feed. This assembly serves 8 cutting operations.

lo-jet acro

- prolongs tool life
- cuts tool breakage loss
- saves money
- speeds production
- keeps work clean

there is a lo-jet acro *system for every purpose and every machine.*



write now for more information at no obligation.

Our engineering staff will cooperate free of charge.

lo-jet acro *is a product of*

AIR CONVERSION RESEARCH CORPORATION

4107 North Damen Avenue • Chicago 18, Ill.

Air Conversion Research Corp. MT
4107 N. Damen Ave.
Chicago 18, Ill.

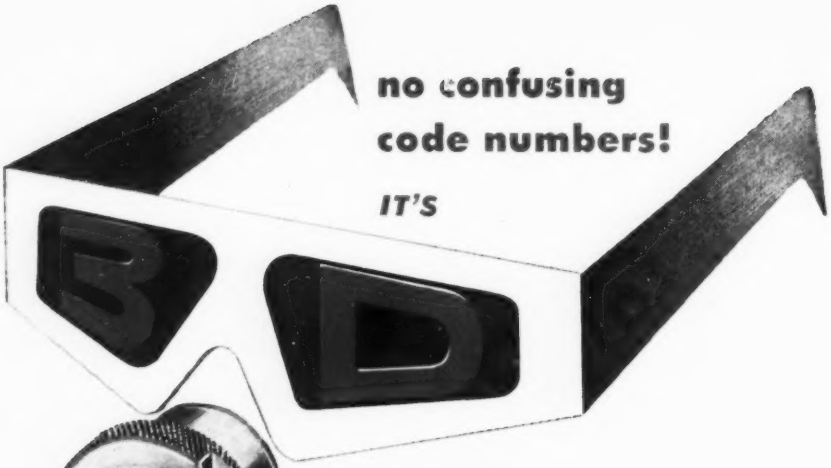
Gentlemen: Please send me full information about lo-jet acro's coolant system.

name and title

firm

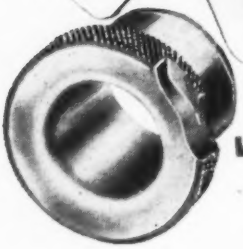
address

city and zone state



no confusing code numbers!

IT'S 3-D

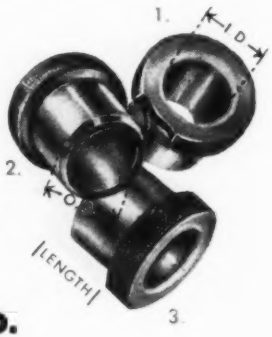


WITH American

It's not new! For years American has used 3-D to simplify ordering drill bushings. American's original three dimension ordering plan; 1–I.D., 2–O.D., and 3–length, eliminates confusing code numbers...saves time, trouble!

Fully stocked distributors located in every major area throughout the U. S. You can get the *right* drill jig bushing *when* you want it!

Order American Drill Bushings the 3-D way... send for the new catalog with the KING SIZE selection of standard sizes.



AMERICAN DRILL BUSHING CO.

5107 Pacific Blvd., Los Angeles 58, Calif.

TRADEMARK

SPECIALIZING ONLY IN DRILL JIG BUSHINGS

POSITIVE DRIVE... QUICK CHANGE

with Continental Counterbores...

You can reduce your tool cost, improve accuracy, and increase production with the Continental complete line of standard drive interchangeable cutting tools. Cutters have a balanced, indestructible drive—originated by Continental—that will not stick, will not break, and is hand detachable after toughest cuts.

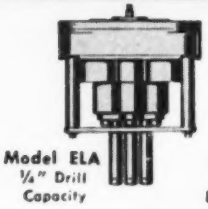
Order through your local Ex-Cell-O representative or write to Continental in Detroit.

CONTINENTAL TOOL WORKS

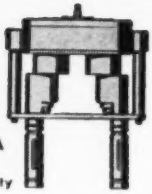
Division of Ex-Cell-O Corporation

DETROIT 32, MICHIGAN

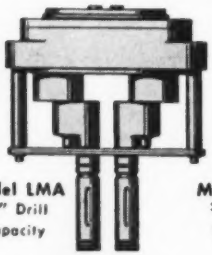
HEADS to Solve Your Drilling, Tapping, Boring Problems



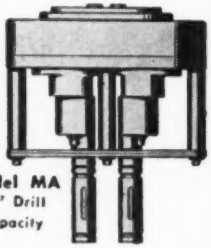
Model ELA
1/4" Drill Capacity



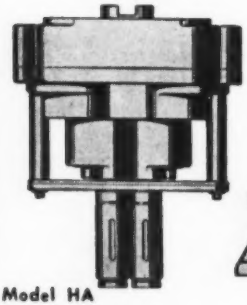
Model LA
13/32" Drill Capacity



Model LMA
5/8" Drill Capacity

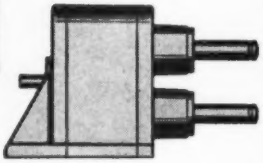


Model MA
3/4" Drill Capacity



Model HA
1 1/4" Drill Capacity

Fixed Spindle Models
Size and Capacity as specified



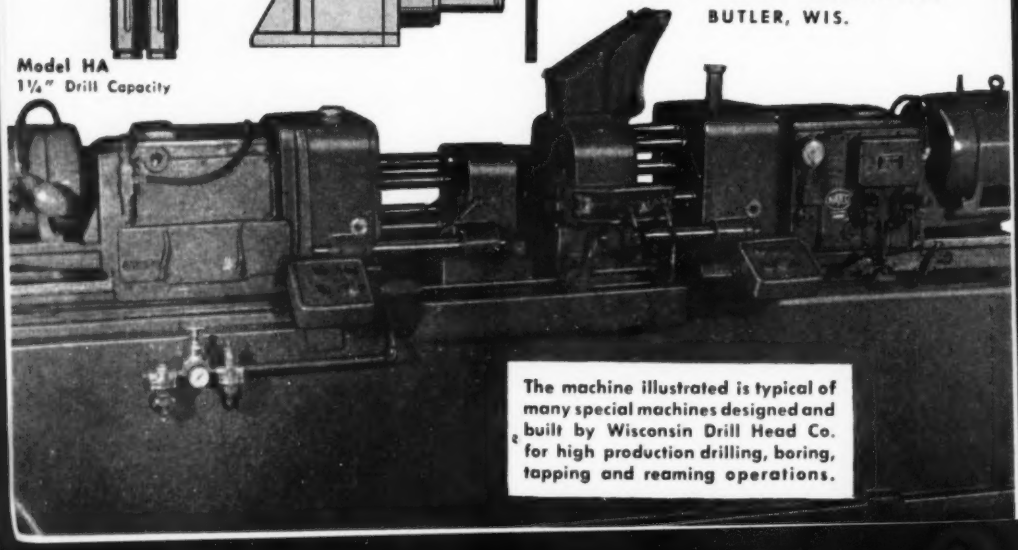
WISCONSIN *Adjustable Spindle*
Drill Heads completely gear driven . . . are available in 5 Standard Models, with 2 to 8 spindles and Drill Capacities from 1/4" to 1 1/4" . . . permit adjustment to any hole pattern. Adjustable Heads with 9 or more spindles are built-to-order.

WISCONSIN *Adjustable Spindle*
Drill Heads . . . have Two-Piece Positioning Templates for Fast, Accurate Set-ups that stay put.

WISCONSIN *Fixed Spindle*
Drill Heads are built to special order in any size or capacity specified for Drilling, Tapping, Reaming and Boring.

Look to Wisconsin for Drill Heads to solve Your Problems.

WISCONSIN
DRILL HEAD COMPANY
BUTLER, WIS.

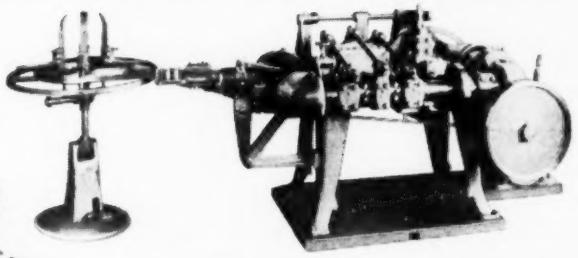


The machine illustrated is typical of many special machines designed and built by Wisconsin Drill Head Co. for high production drilling, boring, tapping and reaming operations.

NILSON FOUR-SLIDE

It's easy to get
HIGH PRODUCTION
. . . and UNIFORMITY, too!

Wire and Ribbon Metal
FORMING MACHINES



UNIFORMITY in automatic production doesn't come by chance! In the case of wire and ribbon stock forming on NILSON 4-SLIDES, *it means control of the material from the coil to the final form.*

Parts, such as illustrated, are produced to tolerances of .002 at critical dimensions. Dies and forming tools, once installed (faster and simpler with NILSON'S open construction) maintain close tolerances for short and long runs. One machine! One set-up! Increased production! Maximum uniformity!

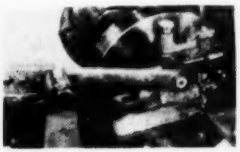
Model SF3 NILSON 4-SLIDE, shown above, with No. 51B Tilting Stock Reel, is a complete unit that can be set-up in any convenient location.

Range of sizes

Wire Forming —
1/32" through ½" wire. Feeds up to 32".

Ribbon Stock Forming —
1" through 3½" wide material. Capacity of press section 5 to 30 tons; 50 to 75 tons in heavy duty types.

Close-up of the NILSON forming section with the built-in Horizontal Press to the left. This design eliminates secondary handling and insures product uniformity because the sequence of stamping and forming is automatically controlled.



Close-up of the NILSON feed mechanism . . . capable of feeding wire and ribbon metal to tolerances of .001. Another important element in insuring product uniformity. Positive control is maintained over the material regardless the length of feed.

For specific recommendations — send details of your operation.

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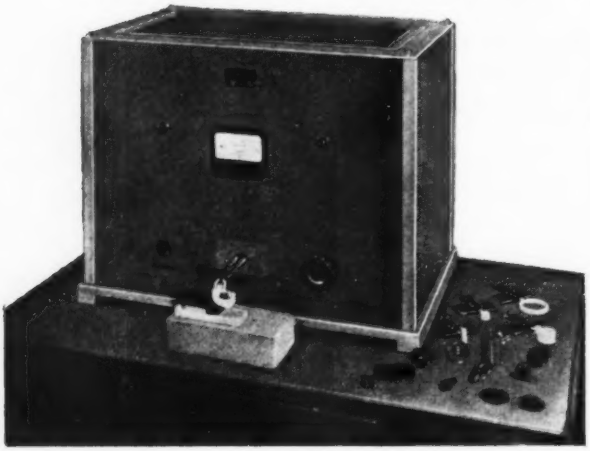

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Permits widest choice of silver or copper brazing alloys from lowest to highest melting points. Ideal for brazing carbide tips.

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Heat localized exactly where wanted at desired temperature. Ideal for gears, cams, bearing surfaces, cutting tools and other areas that are subject to wear.

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Speedily and neatly performs intricate soldering applications with or without the use of pre-formed rings.

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Ideal for annealing, stress-relieving, normalizing or pre-heating selected areas.

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Readily melts quantities of ferrous and non-ferrous metals in either graphite or ceramic crucibles.

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- **FULLY GUARANTEED** Guaranteed for continuous duty cycle and stated performance.

This versatile unit is priced so low that every shop may now take advantage of modern induction heating techniques to improve quality and to increase production. Its simplicity of operation eliminates the need for skilled personnel.

The Lepel Model 2 KW will meet the requirements of machine shops, toolrooms, research laboratories and educational institutions. It is especially suitable for hardening, brazing and soldering small parts of either ferrous or non-ferrous metals.

Complete unit with line connection and load coil.

$870.

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1/8" steel rod 1" length in approx.	1 second
1/4" " " " " "	3 seconds
1/2" " " " " "	15 seconds
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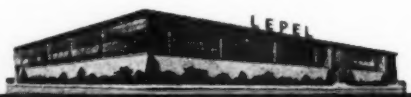
Will melt 4 ounces of brass or steel in 4 minutes.
Equally well suited for heating of non-ferrous metals.



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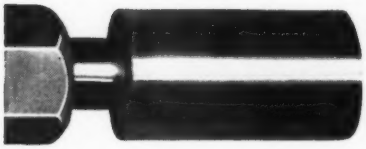

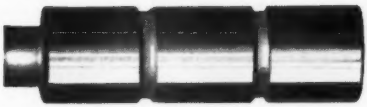

*Tungsten Carbide Coated by Linde Process

For complete information on this new process as applied to both gages and precision parts, write for our new bulletin.

Carbide wear life at substantially lower cost . . . provided by this new process being applied for the first time by Lincoln Park in the manufacture of gages. Other advantages such as resistance to shock and increased accuracy under varying temperatures add to the outstanding value of Carb-O-Plated Gages for high volume inspection.

Employing the "Linde" flame plating method, Carb-O-Plated Gages are made with a steel base and a thin wear-resistant coating of tungsten carbide. The coating has approximately the same properties as sintered carbide —92% tungsten carbide and 8% cobalt. Some of the principal features of the gages are these:

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MECHANICAL BOND — The mechanical bond between carbide coating and steel base precludes change in properties or warping.

INCREASED ACCURACY — In normal temperatures, these gages undergo identical thermal expansion and contraction as the steel part being gaged. They can be used anywhere without need of temperature-controlled rooms.

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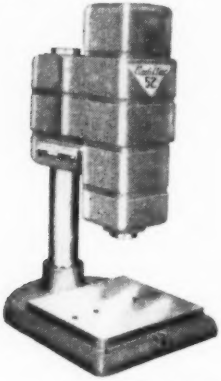
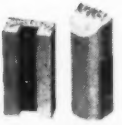


This new Cadillac "52" is faster, has more power, more pressure. It delivers in speeds up to 10,000 strokes per hour — pressure can be obtained up to 8 tons, and is adjustable from light to heavy marking. The pressure can also be regulated to give proper ram action for branding or color leaf marking. Special jigs or fixtures are not required for average work. The Cadillac "52" has automatic controls which "think" for the operator — give high production. Can be supplied as: Hand actuated, foot actuated, electrically actuated. It is light in weight, can be easily moved.

For full information write for Bulletin A-52



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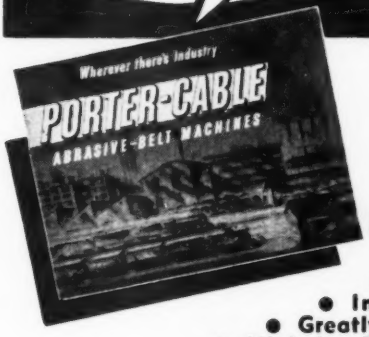

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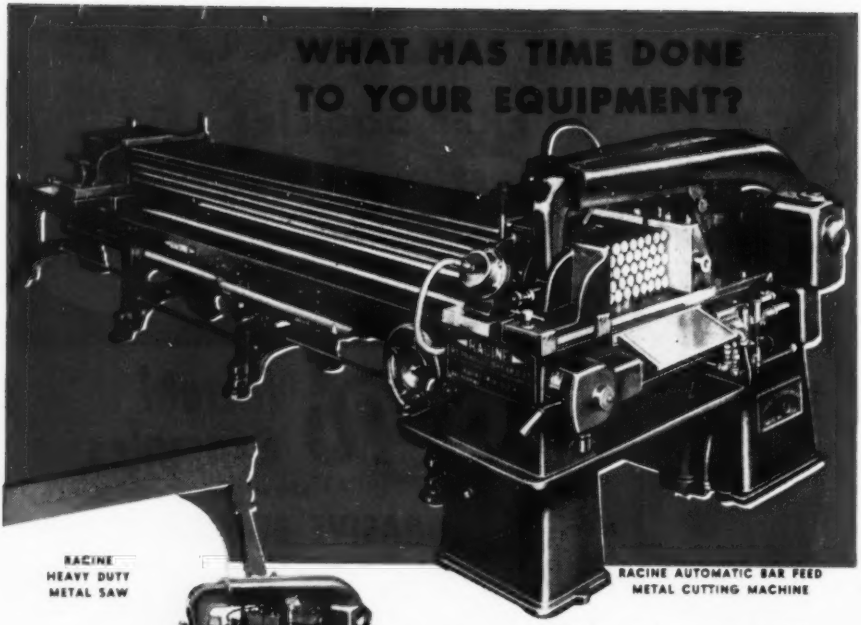
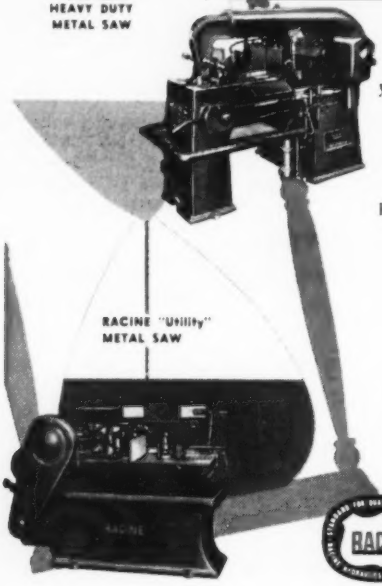


RACINE AUTOMATIC BAR FEED METAL CUTTING MACHINE

RACINE HEAVY DUTY METAL SAW



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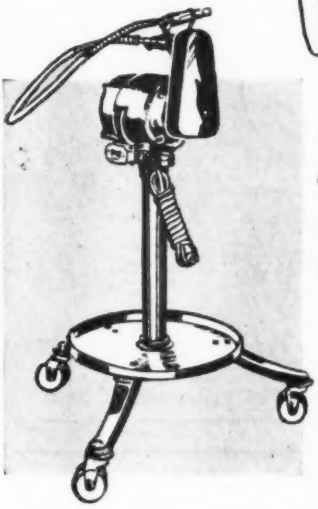

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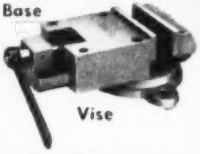

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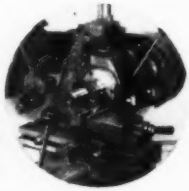

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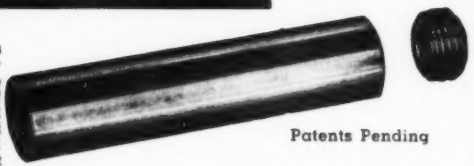

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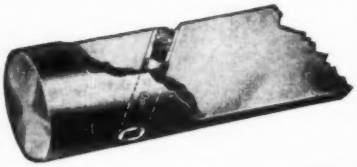

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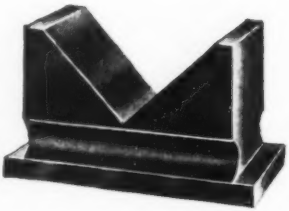

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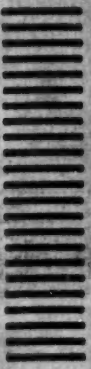

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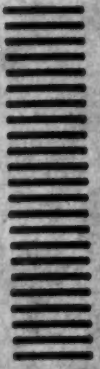

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AUGUST, 1953

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1	11	21	31	41	51
2	12	22	32	42	52
3	13	23	33	43	53
4	14	24	34	44	54
5	15	25	35	45	55
6	16	26	36	46	56
7	17	27	37	47	57
8	18	28	38	48	58
9	19	29	39	49	59
10	20	30	40	50	60

Please Print

Company.....

Name.....Position.....

Street.....

City.....Zone.....State.....

MACHINE and TOOL BLUE BOOK

READERS' SERVICE DIVISION
WHEATON, ILLINOIS

AUGUST, 1953

Please send information on NEW PRODUCTS described on the following pages:

....

....

Please send data on the items ADVERTISED on the following pages:

....

....

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Company.....

Name.....Position.....

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The Green Engraver

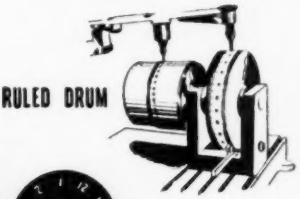
Used and endorsed by tool and die, electronic, machine, plastics, radio, electrical and instrument manufacturers.

A real money saver.

ENGRAVES
ROUTS
PROFILES
and MODELS

NUMBERED RING

RULED DRUM



STENCIL

FREE: Brochure—
yours upon request.

Special attachments and engineering service available for production work.

Specify the Green Engraver for precision engraving on metal, plastics, wood, glass, hard rubber etc. . . . engraves panels, name plates, scales, dials, molds, lenses, instruments, instruction plates, directional signs . . . by simple tracing from master. *Routing, profiling and three dimensional modeling indicate its versatility.* Electric etching attachment available.

Green Instrument Co.
INCORPORATED

386 PUTNAM AVENUE
CAMBRIDGE · MASS.

JOHNSON BAND SAWS

SPECIFICATIONS
MODEL B

Capacity—5" rounds, 10" flats.
Height Overall—(Closed)—32".
Blade Length—7'5" x ½" x 23 ga.
Floor Space—46" x 28".
Weight—(Uncrated) 235 lbs. Crated 280 lbs.
Boxed for Export 400 lbs.

Wheel Diameters—10".
Motor—⅓ H.P. any voltage available.
Speeds—45, 90 and 150 ft. per min.
Casters—Optional at slight extra cost.

MODEL J, 10" x 18" CAPACITY ALSO AVAILABLE

WRITE FOR DETAILS

JOHNSON MANUFACTURING CORP.

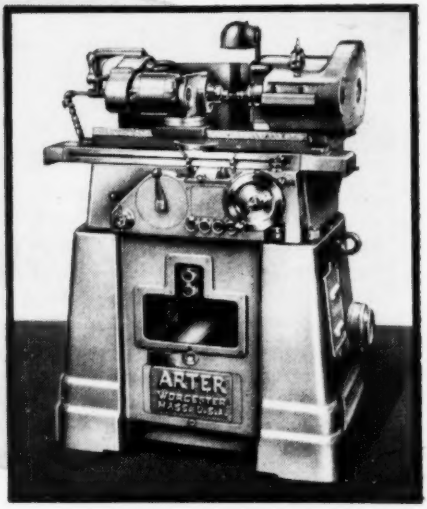
ALBION, MICHIGAN

ARTER *Precision*

Internal and External Grinding

Model EG "103"
Cylindrical Grinder

Model "103" Cylindrical Grinder — dual purpose external cylindrical and internal grinding machine, built as an external grinder only, or as an internal grinder only. Convertible equipment available at any time. Hydraulic table movement, hand and automatic in-feed of the wheelhead through worm, worm wheel and screw. Work table, wheelhead and headstock can be swivelled for grinding angular work. Face grinding also possible.



Model IG "103"
Internal Grinder

Model IG "103" Internal Grinder has the same general construction and operating means as the cylindrical grinder. The self contained wheelhead has a ¾ h.p. in-built motor with belt drive for either a 15,000 or 32,000 RPM spindle unit. Machines are self contained, the coolant tank and hydraulic oil tank being within the base.

Write today for complete details and specifications

Arter GRINDING MACHINE CO.
WORCESTER 5, MASSACHUSETTS

Beaver BLADE-SETTING AND INSPECTION FIXTURES GIVE FASTER, MORE ACCURATE JOBS . . . CUT COSTS IN HALF!

Adjustable setting-post assembly, (No. F-2861-A), instantly and accurately positions each blade.

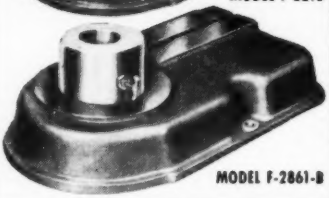
This is an F-2861-B fixture with No. 50 NMTB taper spindle and adaptor, equipped with setting-post assembly.

A convenient spindle-lock located on the right side of the spindle, holds the work in any desired position.

Accurate and frictionless spindle takes any tool with No. 50 NMTB taper shank or any style cutter with No. 50 NMTB adaptor.

BEAVER blade-setting fixtures take ALL the guesswork out of blade resetting. These fixtures are also ideal for checking the accuracy of any type cutter or tool after grinding. With the aid of a Beaver blade-setting fixture, the grinding and resetting operation takes about one-half the usual time required. Anyone familiar with milling cutters can do an expert job without long experience. Available in two types—No. F-2213 with solid spindle and adaptor bushings or No. F-2861-B with 50 NMTB Taper spindle mounted in precision anti-friction bearings.

MODEL F-2213



MODEL F-2861-B

See our Catalog 52 for cost reducing Beaver Tools

Beaver TOOL AND ENGINEERING CORPORATION

2850 ROCHESTER ROAD • BOX 429, ROYAL OAK, MICH., Teletype - Big Beaver 648

In stock 400 sizes of 21 standard CLEVELAND PUNCHES!

For your convenience we carry 400 sizes of our 21 standard punches and matching dies in stock. Punching diameters range from $\frac{5}{32}$" to $1\frac{1}{2}$". You will get prompt shipment of any standard punch. Special sizes or shapes will be made to your specifications.

Don't overlook the savings offered by the Cleveland system of standardization. You can punch any size hole from $\frac{1}{8}$" to $1\frac{1}{16}$" by using the same coupling nut and punch stem.

Are you obtaining maximum service from your Punches and Dies? Protect tool life—send for copies of our two-color wall instruction chart, "Proper Care of Punches and Dies."

A-5169

PUNCHING TOOLS & DIES

OFFICES AT
NEW YORK . . . CHICAGO
DETROIT . . . PHILADELPHIA
E. LANSING

THE CLEVELAND PUNCH & SHEAR WORKS CO.
U.S.A.

Established 1880

POWER PRESSES

FABRICATING TOOLS

CLEVELAND 14, OHIO

Tank Maneuver on the Production Front

A military contractor in Minnesota paid an outside firm $6 per wheel just to remove worn tires from tank track wheels. An alert management saw in the Dake 150-ton hydraulic platen press an opportunity for a smart, moneysaving operation.

When the press had been installed, it brought these interesting results:

- **Two operations were combined into one—pressing the old tire off the wheel, and pressing the new one on in a single move.**
- **The removal-replacement job now costs only 15 minutes of an employee's time—compared to $6 per wheel for removal only as it was handled before.**
- **It saves the time lost in sending work out — avoids delays in the supplier's shop—helps get jobs delivered on time.**

How about your production? It may very well be that a Dake Press will speed up work for you, too. Dake has a wide variety of hydraulic presses in its standard line . . . also stands ready to custom-engineer presses for jobs that standard models can't handle. It will pay you to consult your nearest Dake distributor.

Dake Engine Company, 608 Seventh St., Grand Haven, Mich.

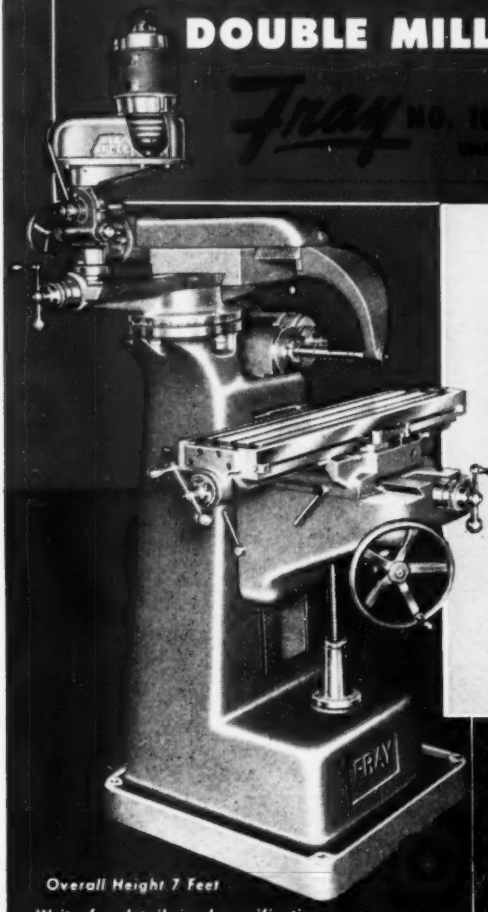
DAKE PRESSES

FRAY TOP SLIDES

DOUBLE MILLING RANGE

Fray NO. 10RH MILLING MACHINE

UNIVERSAL RAM • KNEE TYPE



Overall Height 7 Feet

Write for details and specifications . . . Request Bulletin # 10

A Fray pays bigger production dividends by performing an unequalled range of milling operations. Both of the top slides on the Fray 10 RH are easily adjustable. This feature permits alignment of the turret slide with the table, *thus doubling longitudinal and cross milling range* . . . or you can just as simply set the turret at an angle to the table and mill in two directions. Combined, the turret slide and table slide provide 38" of overall travel, while the table cross slide, plus the ram slide permits a full 18" of in-and-out adjustment. This equals the overall range of much larger machines. Fray moves precision work faster at less cost.

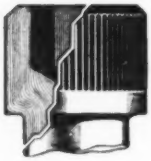
Fray "All-Angle" Head TYPE 4

For deep, heavy cuts. Permits working to extra close limits. Any angle up to compound 2-way. Request Bulletin 4.

All-Angle

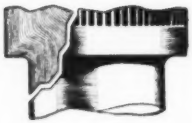
FRAY MACHINE TOOL CO.

515 WEST WINDSOR ROAD, GLENDALE 4, CALIFORNIA



HEAD. Forged for maximum physical strength. Diameter and height are precision controlled—any deviation could be serious. Knurls, originated by SPS, provide easier handling and faster assembly by oily fingers.

SOCKET. Uniform depth and size assure strength and maximum torque in wrenching—extremely important in such a screw.



FILLET. Completely formed to provide maximum resistance to shear and continuous grain flow throughout length of screw.

There's much more to an UNBRAKO than meets the eye

When you pick up a socket cap screw, you don't stop to examine it—it's so commonplace.

If you did, and it's an UNBRAKO, you'd marvel at the knurled head, the uniform hex socket, the smooth shank, the precision threads, all combined to make a strong, close tolerance fastener.

Quality control—from the selected alloy steels to the finished product—makes an UNBRAKO Socket Cap Screw what it is, the finest you can buy. Write for UNBRAKO Standards. SPS, Jenkintown 52, Pa.

UNBRAKO® SOCKET SCREW DIVISION

SPS

Stocked and sold by leading industrial distributors everywhere

JENKINTOWN PENNSYLVANIA

THREADS. Fully formed to maintain continuous grain flow and prevent shearing. Made to Class 3 fit. Controlled fillet at root of threads gives added tensile and fatigue strength.

UNBRAKO Standards—as listed in the SPS Catalog—are stocked by leading industrial distributors everywhere.

DIALIZE and ECONOMIZE

Any AGD Adjustable Limit Snap Gage becomes a DIAL INDICATOR Snap Gage with a STANDARD Dializer

Patented

Simplicity Itself!...

By removing a pair of pins from the snap gage and inserting a STANDARD Dializer any make of AGD Snap Gage in any model, A, B or C, is instantly converted to a DIAL Snap Gage. Dializer is easily transferred from one frame to another.

Dializers are available for complete range of AGD Adjustable Limit Snap Gages (MODELS A, B or C)

No. 1 fits AGD Frames 1 thru 6
No. 2 fits AGD Frames 7 thru 10
No. 3 fits AGD Frames 11 thru 16

No. 3 Dializers also fit larger size frames beyond AGD size range (available from STANDARD) for dimensions up through 26⅜".

ACCURACY ASSURED by double reed principle.

RANGE OF ADJUSTMENT of gage is unaffected.

INDICATOR either with .0001" graduations and .005" range, or with .001" graduations and .025" range.

We can supply snap gage frames if you do not already have them. Tungsten carbide contact points, anvil blocks and snap gage pins are also available.

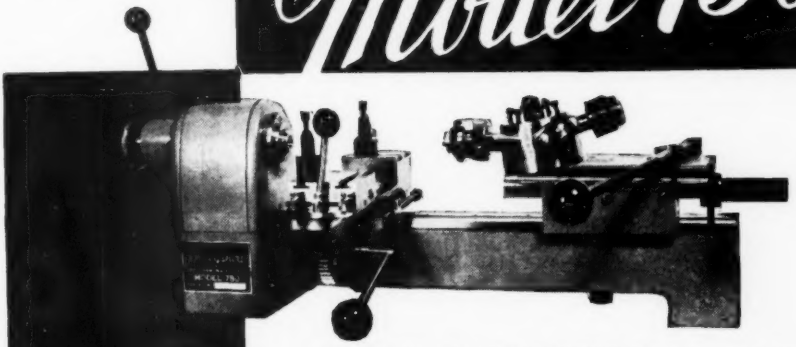
Write Today for Your Copy of Catalog C

Dialize Your LENGTH GAGES, too!

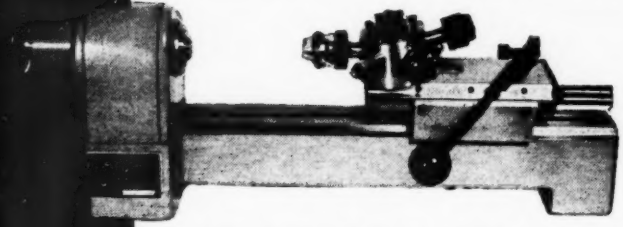
Dializers can also be used on any AGD Adjustable Limit Length Gage, Progressive Type for internal or external measurements.

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.

DERBY LATHE "Model 750"



Lathe, 22" bed, Ball Bearing Headstock with Lever-Collet Closer, Pt. No. 3804, with Double Compound Slide Rest, Pt. No. 3652 and Six-position, self-indexing and semi-automatic Turret, Pt. No. 3610.



Lathe, 22" bed, Ball Bearing Headstock with Lever-Collet Closer, Pt. No. 3804, with Six-Position, self-indexing and semi-automatic Turret, Pt. No. 3160.

SPECIFICATIONS

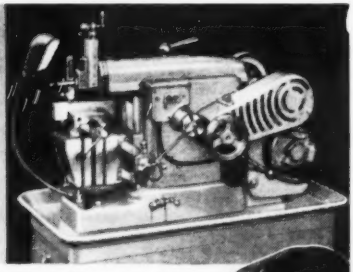
Overall Length With Lever Chuck Closer 25"	Distance between Centers.....12"
Length of Bed .....22"	Center Height .....2.953" (7.50 cm)
Height to Top of Headstock 8½"	Maximum Collet Capacity .....315"(⅝")-(No. 80 metric)
Height to Top of Lathe Bed 4"	Maximum Spindle Speed .....18,000 RPM
Width of Bed .....2⅞"	Concentric Running of Ball Bearing Headstock Spindle ..... .0002"
Width of Ways .....1-13/16"	Spindle Speeds with Variable Speed Drive:
Swing over Bed .....5.905"(15 cm)	With Pulley Ratio 1 to 1..... 600 to 5,000 RPM
Swing over Compound Slide Rest .....2⅜"	With Pulley Ratio 2 to 1.....1200 to 10,000 RPM

F. W. DERBYSHIRE INC.

157 HIGH ST. • WALTHAM, MASS.

South Bend 7" Shaper

FAST • EFFICIENT • ECONOMICAL!

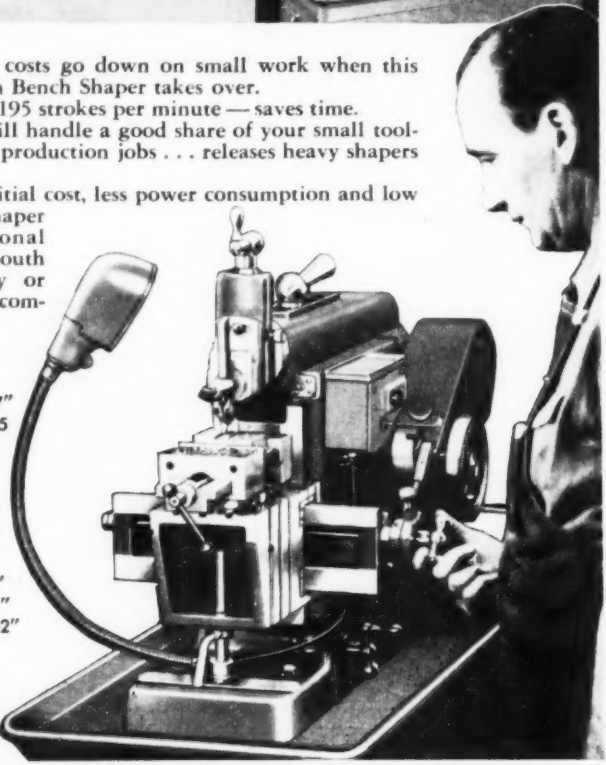


Watch your machining costs go down on small work when this South Bend 7" Precision Bench Shaper takes over.

FIRST, its speed — 42 to 195 strokes per minute — saves time.

SECOND, its 7" stroke will handle a good share of your small toolroom, maintenance and production jobs . . . releases heavy shapers for larger work.

THIRD, with its small initial cost, less power consumption and low upkeep, this versatile shaper can save you additional money. Call your local South Bend distributor today or send the coupon for complete information.



SPECIFICATIONS

RAM

Stroke length . . . . 0 to 7"
Strokes per min. (4) 42 to 195
Cutting speeds . . . . 3 to 114 feet per minute

TOOL HEAD

Vertical travel . . . . . 3"
Head swivels . . . . 360°

TABLE

Vertical travel . . . . . 5"
Horizontal travel . . . 9½"
Power cross feeds (6) .002" to .012" (reversible)

VISE

Maximum opening . . 4"
Jaw width . . . . . 4"
Jaw depth . . . . . 1"

PLEASE SEND INFORMATION CHECKED:

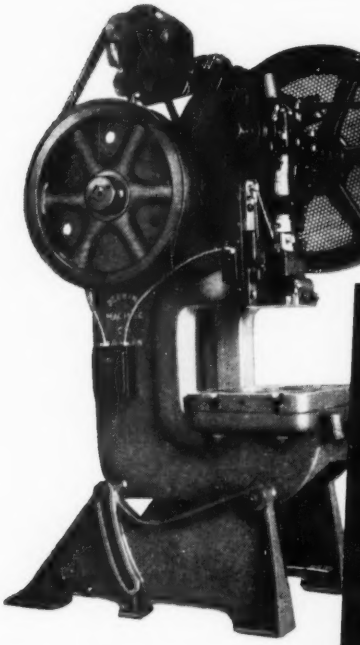
☐ _____

☐ TOOLS & ATTACHMENTS ☐ 9" and 10" BENCH LATHES ☐ 10" to 16-24" FLOOR LATHES ☐ DRILL PRESSES ☐ TOOL GRINDERS ☐ ½" & 1" Collet TURRET LATHES ☐ 7" BENCH SHAPERS

Name _____ Company _____

Street _____ City & State _____

Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana



Perkins 550B Geared Press

PERKINS *Standard* MODEL B PRESS

Perkins Model B Standard Presses are built for heavy duty service and high production. They are quickly adaptable to most types of work and are readily accessible. They have the inclinable feature and may be furnished with plain flywheel drive for faster production or back gearing for heavy blanking and forming operations.

Model B Presses are supplied with a variety of strokes and ample die space for highly efficient operation and to meet most requirements.

Your inquiries are welcomed. Write for catalog.

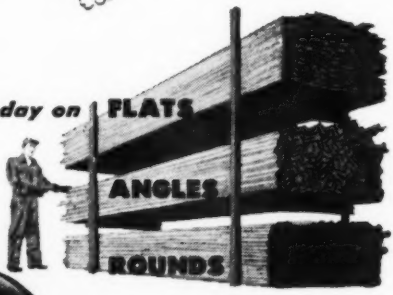
PRESSES BUILT TO SPECIAL SPECIFICATIONS

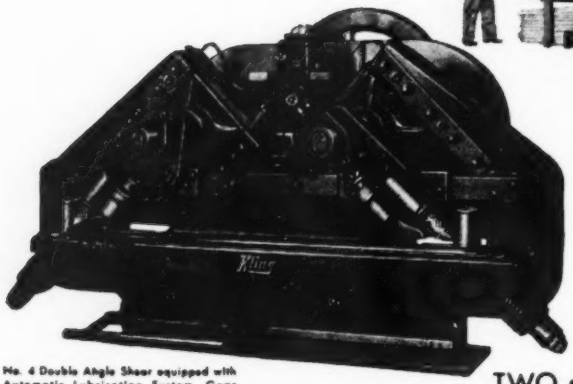
Perkins Power Presses SINCE 1885

PERKINS MACHINE CO.
WARREN, MASSACHUSETTS

It's the BUSIEST machine in the shop!

...gives more cuts per day on





No. 4 Double Angle Shear equipped with Automatic Lubrication System, Gear Guards and Automatic Hold-downs.

Kling double angle shears

TWO shears in ONE machine!

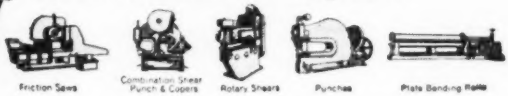
If you're using obsolete, slow-poke methods of shearing, the Kling Double Angle Shear can help you save time and money. This modern compact machine is designed for high speed, high production shearing on both long and short run jobs. Many metal fabricating plants and steel warehouses have found the Kling Shear to be the workhorse of the shop. For instance, one machine will shear round bars and bar angles on the left side while the right side can be used for structural angles and flat bars. The machine is built with the speed and power to handle the bulk of your shearing requirements. For shops with considerable mitre shearing work, Kling Double Angle Shears can be mounted on a turntable to facilitate handling. Automatic hold downs and one-shot lubrication can be furnished when desired. Sizes to handle angles up to 8" x 8" x 1½"

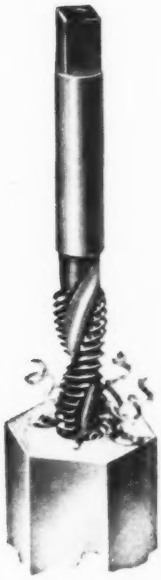
WANT TO CUT SHEARING COSTS?

Find out how this high-production machine, available in four sizes, can give you more cuts, cleaner cuts on your shearing operations. Write for more information and latest bulletin. Kling Bros. Engineering Works, 1323 North Kostner Avenue, Chicago 51, Illinois.

SEND FOR NEW BULLETIN 2345 **5808 MMRRR**

Since 1892 **Kling** ***...an investment in speed!***





What do *you* look for in a Tap, Mr. Johnson?

That will be *"performance-ability"* . . . something that you cannot see at first glance.

This has been built into the tap through proper selection and heat treating of the tap material, and the precision processes of machining the tap . . . processes that challenge the statement so often heard, "taps are all alike." That's why it pays to specify —

Hanson-Whitney...

Through the Hanson Process . . . the *original method of finishing after hardening* . . . Hanson-Whitney has for 34 years produced a quality line of precision taps. We have never manufactured cut thread or unfinished taps.

Yes, Mr. Johnson, that's why Hanson Process Taps give you the dependable day-in, day-out production performance recorded on your cost sheets. Naturally, the right tap for the specific job is essential. Ask the Hanson-Whitney representative for his recommendations.

the HANSON

Threading Processes After Complete Coordinated Responsibility

The Machine Tools
The Cutting Tools
The Measuring Gages

Our "Mr. Johnson" typifies the thousands of practical machinists in America. You'll find him in your shop. Ask him what he thinks about H-W Taps.

HANSON-WHITNEY DIVISION of the WHITNEY CHAIN CO.

160 Bartholomew Avenue, Hartford, Connecticut, U. S. A.

3HW33B

WHAT DOES FIRTH STERLING OFFER YOU?

(ANSWER NUMBER 2)

ONE SOURCE FOR ALL TOOLING NEEDS

THE *RIGHT* STEEL *OR* CARBIDE . . . THE *EXACT* METALLURGICAL COMBINATION NEEDED TO DO YOUR JOB BEST . . . FROM A SINGLE MANUFACTURING SOURCE

The next time you have a difficult tooling problem we invite you to call in a Firth Sterling man.

He may be called a "tooling specialist" or a "sales engineer" . . . but anyhow he's just a fellow who understands the *cutting*, *shaping* and *forming* of metals like nobody's business. He *may* be a graduate engineer, or he may have learned the hard way on a milling cutter, draw

He can give you an unbiased recommendation . . . be-

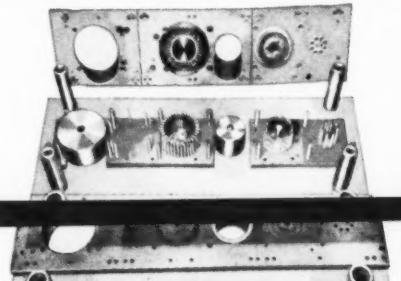
A VERSATILE FAMILY OF *Tool and Die Steels*

CROMOVAN • AIRVAN • INVARO

Certain steels or families of steel stand out as having almost universal application for general use, ranging from moderate to high production as job requirements demand. One such Firth Sterling family of steels consists of CROMOVAN, AIRVAN, and INVARO. CROMOVAN and AIRVAN are air hardening; INVARO is oil hardening.

ANALYSES

	CROMOVAN	AIRVAN	INVARO
Carbon	1.60%	1.00%	.90%
Chromium	12.50%	5.25%	.50%
Vanadium	1.00%	.25%	.20%
Molybdenum	1.00%	1.15%	—
Manganese	—	—	1.15%
Tungsten	—	—	.50%



may have learned the hard way on a milling cutter, draw

He can give you an unbiased recommendation . . . because he has approximately 100 different grades of Firth Sterling high speed steels, and tool and die steels to choose from *and* a dozen grades of tungsten carbide in everything from die nibs to a virtually unlimited variety of standard and special carbide cutting tools and tips.

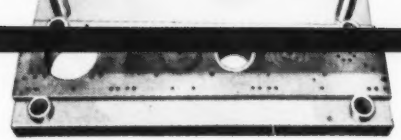
All this is backed by 64 years of leadership in the development and production of special purpose steels, and 21 years of pioneering in carbide and "powder metallurgy" applications.

It makes sense, that a company which engages in *all* phases of tooling metallurgy will serve your interests best.

Remember, Firth Sterling *is* a single, dependable source for complete shop tooling.

Firth Sterling Stands for Metallurgical Achievement—Past, Present, Future

I-2



Generally speaking, CROMOVAN is intended for long production runs where hundreds of thousands or millions of pieces must be produced at minimum cost; AIRVAN for intermediate runs where toughness and high abrasion resistance are also requirements; INVARO, an oil hardening tool steel for all other general use.

Full technical details are available in these free bulletins. Write for them today or ask your Firth Sterling representative to call and discuss your tool and die needs . . . steel *or* carbide.

P-1

Firth Sterling

— INC. —

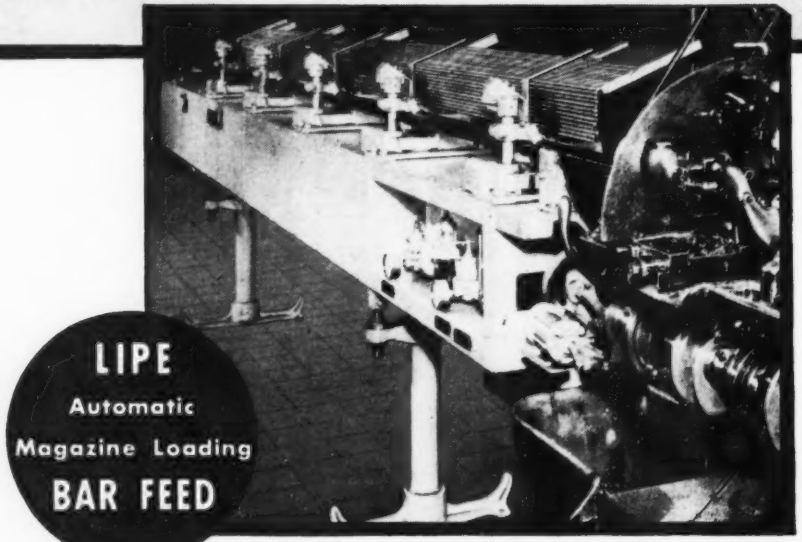
GENERAL OFFICES: 3113 FORBES ST., PITTSBURGH 30, PA.

OFFICES* AND WAREHOUSES: BIRMINGHAM* CHICAGO CLEVELAND DAYTON* DETROIT HARTFORD HOUSTON* LOS ANGELES NEW YORK* PHILADELPHIA* PITTSBURGH* WASHINGTON*

PRODUCTS OF FIRTH STERLING METALLURGY

High Speed Steels
Tool & Die Steels
Stainless Specialties
High Temperature Alloys
Sintered Tungsten Carbides
Firth Heavy Metal
Chromium Carbides
High Temperature Cermets

BOOST SCREW MACHINE OUTPUT 60% to 100%...*EVEN MORE!*



SUPPOSE you could run your screw machine continuously — get a *full* 8-hour-day production — with no time lost for loading, replacing feed fingers, cutting air or idle operation. How much would your production go up? 10%? 20%?

Revise your estimate — you're way low. By converting lost time into productive time in hundreds of plants, *Lipe Automatic Loading Bar Feeds* have increased output 60% to 100%. One user reports a production increase of 221%!

OUR UNCONDITIONAL GUARANTEE. Lipe AML Bar Feed will enable your screw machine to produce at least 90% of its gross geared capacity.

WHAT A LIPE AML BAR FEED WILL DO FOR YOU:

Feed tubes or bars automatically, continuously.

Abolish feed fingers—eliminate time lost in making feed finger adjustments.

Feed stock up to 16" long in one feed-out operation—save the time lost with multiple feed finger feed-outs, thus cutting cycle time.

Reduced cycle time increases gross geared production capacity of screw machine.

- Interested? Send for folder describing AML Bar Feed—operation, benefits, case histories.

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Simplified construction of the new Electro-Mist makes for easy maintenance. For example, unit can be completely disassembled for cleaning without use of any tool. Compact design reduces space requirements to a minimum, permitting location close to operation and saving long, costly duct runs.

Oil mist "on the loose" is both a nuisance and a hazard. Collect it with Electro-Mist and convert a liability into a cash dividend in the form of reclaimed oil—lower plant maintenance costs. For complete product information ask your local AAF representative for Electro-Mist Bulletin No. 251A—or write us direct.

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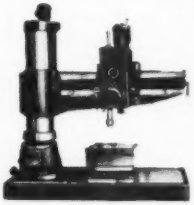
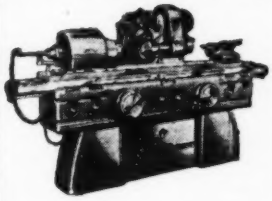
NEW MACHINE TOOLS

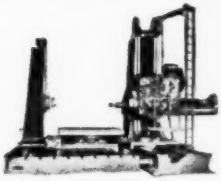
MANUFACTURED BY LEADING MACHINE TOOL BUILDERS



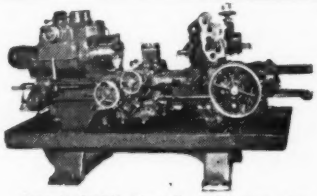
Radial Drills—2', 3', 4', 5', 6', 7', 8', and 10'.



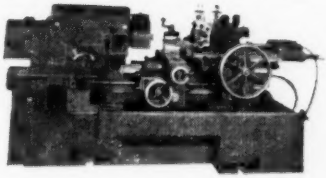
GU Model RU-1000 Universal Cylindrical Grinder, 10"x40".



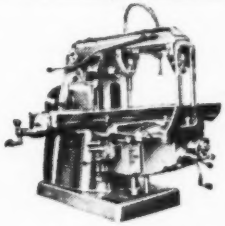
Horizontal Boring Mills, Table & Floor Type, up to 10"; Rotary Tables of Desired Sizes Available.



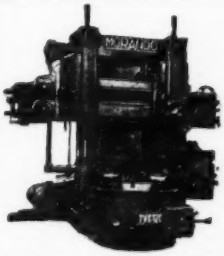
Ram & Saddle Type Turret Lathes, Nos. 3, 4, 1A, 2A, 3A.



New Automatic Electro-Cycle Turret Lathe, Auto-Cycle, Ram-type, Model 40-E.



No. 4 Di Palo Dial Type High-Speed Plain Milling Machine Available. Also: Nos. 2, 3, 4, 5, 6, 10, Plain, Universal & Vertical.



Morando 54" Vertical Boring Mill, Model TVK-120, with Three Heads; Swings 61"; Hydraulic Preselector.

Minganti Jig Borer Model FAV-500C, precision vertical milling and boring machine, with built-in 25½" rotary table. Overall size rectangular table: 30"x61". Table Travel 69".

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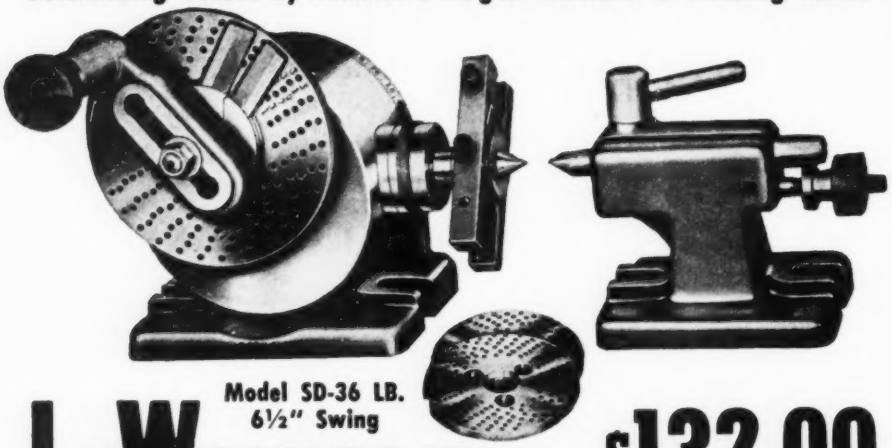

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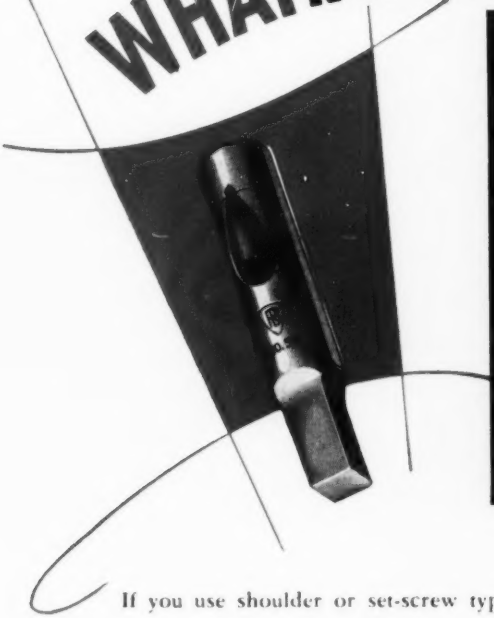

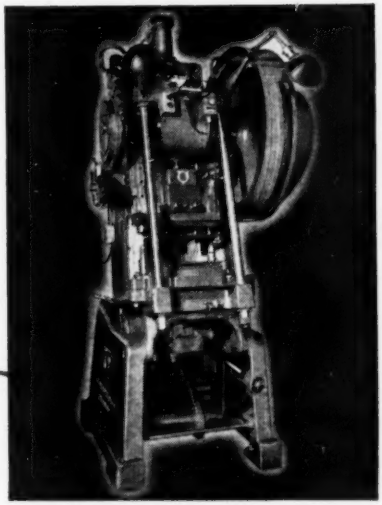

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But, with R-B interchangeable and standardized punches and die buttons you get quick insertion and removal in the press. The R-B ball lock features, that assure positive radial alignment and vertical locking without further keying, permit greater press utilization.

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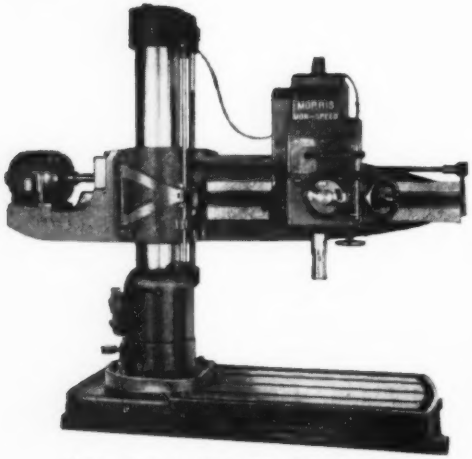

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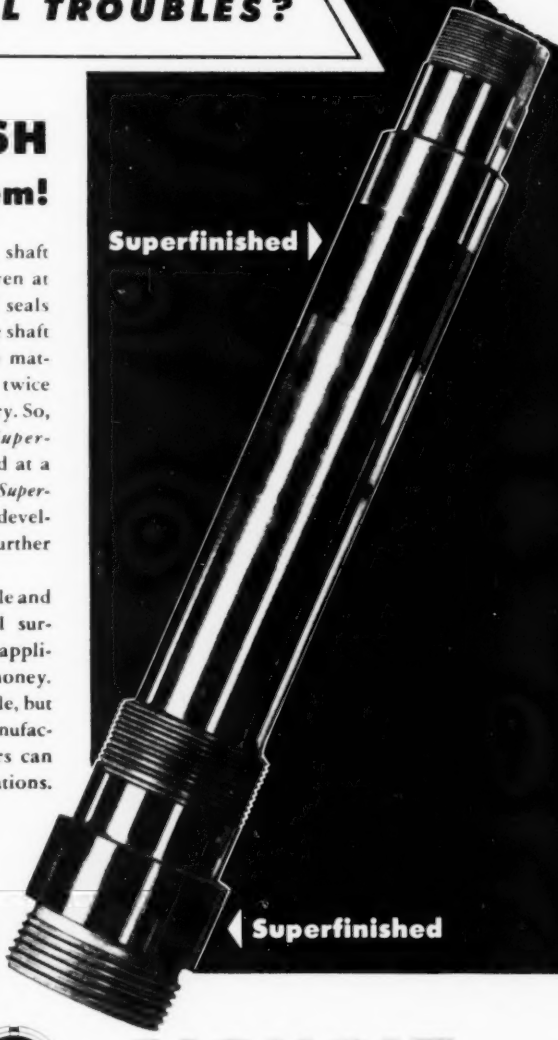

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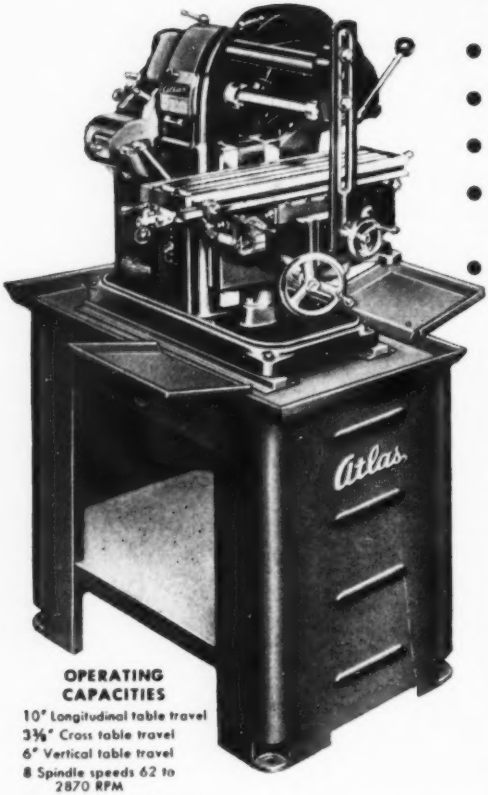

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- Timken bearing equipped
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8 Spindle speeds 62 to 2870 RPM
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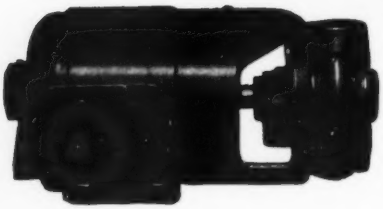

MODEL AG3M Belt Driven ¼ hp thru MODEL AG7M 1 hp.

Pipe sizes, ⅜" to 1½"

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State if for Valves, for Pumps or for both.

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FULFLO COOLANT PUMPS prolong the life of your tools when production demands so much and tools must do more work longer. And when replacements are so expensive or impossible.

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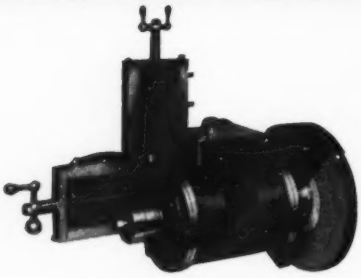
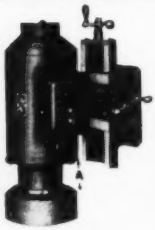
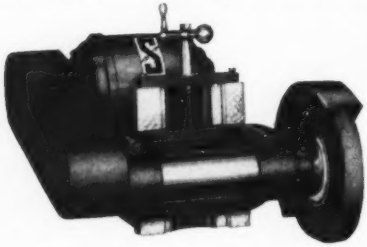


Angle Plate Grinder with horizontal and vertical feeds. ¼ to 10 H.P.

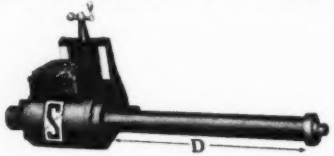


Vertical Spindle Grinder with or without feeds. ½ H.P. to 50 H.P.

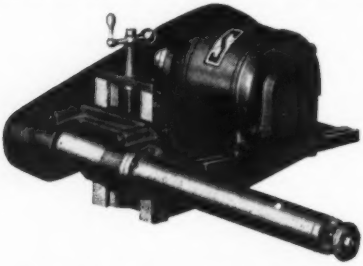
"A" dimension to order up to 16". For Planer, Boring Mill, Surface Grinder, Milling Machine.



Belt Driven Lathe Grinder. ¼ H.P. to 20 H.P.



Internal Grinder, direct motor drive. Grind up to 30" deep. ½ to 5 H.P.



Belt Driven Internal Grinder. Grind up to 24" deep. ¼ to 5 H.P.

Vertical Spindle Grinder, belted motor drive, ½ to 5 H.P.

B = Adapter to fit in ram of Boring Mill.

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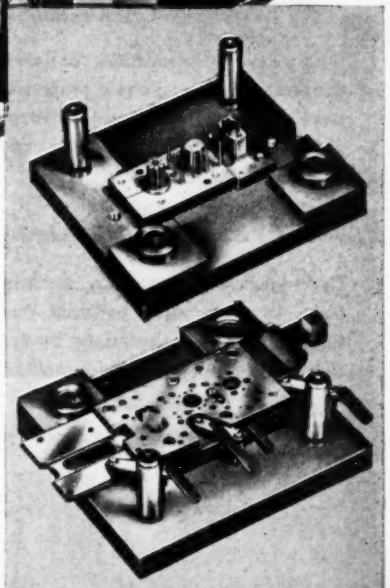

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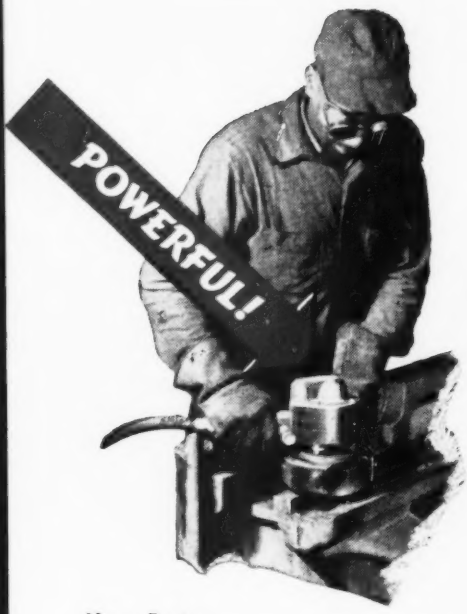
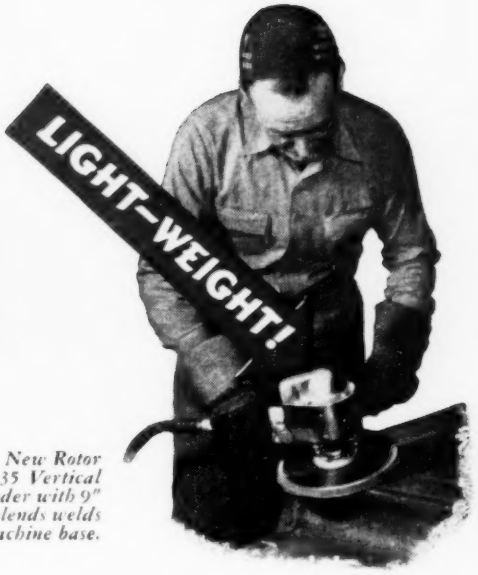


New Rotor B-35 Vertical Grinder with 6" cupwheel smooths a casting.



New Rotor B-35 Vertical Sander with 9" pad blends welds of machine base.

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YOU should try these new Rotor "power houses"! See how fast they remove metal. See how easy they are to handle... light in weight (only 10¾ lbs.) because of magnesium castings . . . comfortable balance because of adjustable handle angle.

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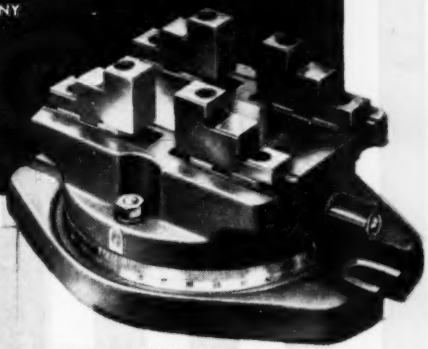

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4 STEPPED JAWS PERMIT CLAMPING of rough castings, irregularly shaped, round, and tapered pieces accurately and quickly, eliminating need for special jigs or fixtures. Narrow stepped jaws allow free access to and measuring of work pieces and provide clearance for cutting tools. Small work pieces machined on three sides without reclamping. Easy and quick to mount and align on any machine. Holds rigid in any position without vibration. Various capacities and extra soft jaws available.

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- Milling Machine Arbors, Adapters, Arbor Spacers & Bearings
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Also Exclusive United States Distributors of European Machines for every operation

MBI

Write for complete details and prices to Dept. 201

M.B.I. EXPORT & IMPORT LTD.

475 Grand Concourse, Bronx 51, N.Y.

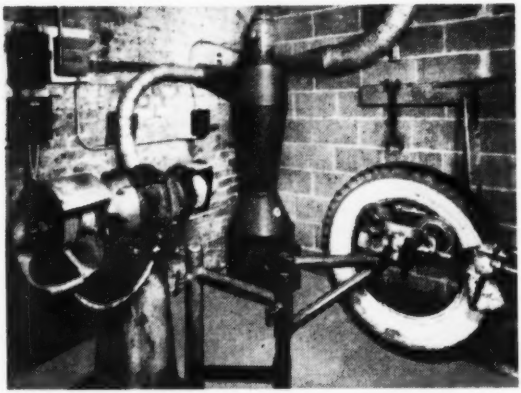
"Over 20 years experience in designing & building machinery"

CABLE ADDRESS: Machbuild New York
Phone: MOtt Haven 5 0900

Ride 'em with—

TORIT

Cyclone DUST SEPARATORS



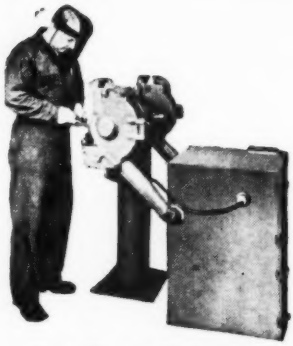
TO RID PLANTS OF ABRASIVE DUSTS

Pecos Pete, legendary cowboy, tamed cyclones for sport. Torit makes them useful.

The ability of a cyclone type Torit Dust Separator to handle large volume is well illustrated above. This model 18-FM unit is making a clean job of getting rubber and fabric dusts from a tire buffing wheel.

If you want to clean up your plant the safe way, install Torit Dust Separators. Like Pecos Pete they'll tackle most any industrial dust problem and run it down to a gentle zephyr. Do it economically too, with little or no interference with present and future production layouts. To get the dope shoot us a line.

see our catalog in MACHINE TOOL CATALOGS or write for copy



Torit Dust Collectors are available in both cabinet and cyclone types, in sizes ranging up to 5 h.p.

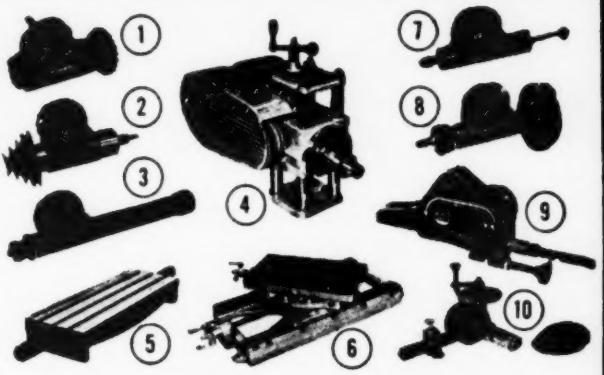
TORIT MANUFACTURING CO.
303 Walnut Street St. Paul 2, Minn.

master
MACHINE TOOL ATTACHMENTS

for

LATHES
TURRETS
MILLS

OR USE INDEPENDENTLY



1. 90° Universal Milling Head
2. Hi-Speed Milling and Drilling Head
3. Deep-Hole Internal Grinder Head
4. Basic Milling Unit
5. Milling and Grinding Table
6. Universal Feed Table
7. Internal Grinder Head
8. External Grinder Head
9. Slotting and Keyseating Head
10. Geared Dividing Head

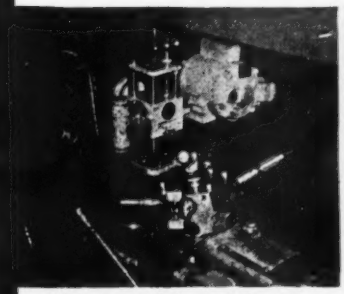
MACHINE TOOLS

★ ★ **THREE SIZES** ★ ★

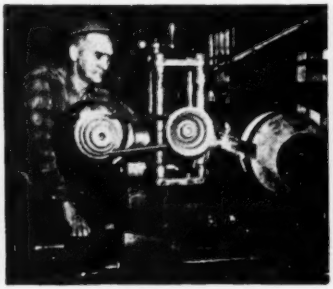
MODEL "C," ⅓ hp—9" to 13" LATHES
MODEL "B," ½ or ¾ hp—13" to 18" LATHES
MODEL "M," 1 to 3 hp—18" to 72" LATHES

The Master attachment can be used profitably on many production operations. Mount it on your present equipment, lathes, turrets, mills, or use independently to perform additional operations in the same set-up. The basic milling unit with the above types of precision heads gives you facilities for milling, grinding, boring, drilling, indexing, slotting, and keyseating, internal and external. Its full complement of equipment is an **outstanding** value for maintenance, repair, tool room, and experimental shops, as well as production, thus performs a full range of shop operations at a minimum investment. These improved models are outstanding in rigidity, capacity, and simplicity of set-up and operation and incorporate the latest features developed in our 17 years of manufacturing this tool. Investigate this valuable shop tool. For the cost of one single-purpose machine, you can have several Master units producing. Prompt deliveries.

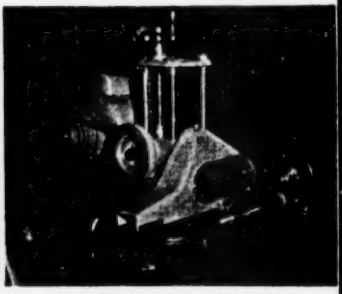
MAKES LOW-COST INDEPENDENT PRODUCTION SET-UPS — PORTABLE — SELF-POWERED



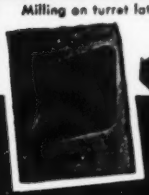
Milling on turret lathe completing part in one set-up



End Milling 2½" keyway in 9⅞" diameter shaft 22 ft. long



Master Slotting Head on lathe cutting internal taper keyway



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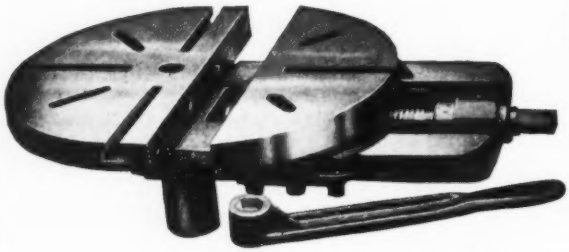
MASTER MANUFACTURING CO.

EAST AVENUE A • HUTCHINSON, KANSAS, U.S.A.

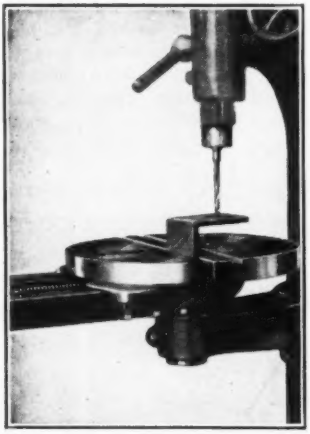
Try the MODERN SAFETY DRILL TABLE



Under Our
FREE TRIAL OFFER

For Faster, SAFER Work in Your Maintenance Department

Combines a drill table, a vise, a set of parallels and V block. No more lost fingers, from hand held jobs that slip. No more 30 minute set-ups for a 1 minute drilling operation. Made in 6 sizes, from 8" to 28" dia. We guarantee each Safety Drill Table will save its cost on labor alone in 6 months, to say nothing of plant down time when vital maintenance is delayed even a few minutes.



WRITE FOR FREE FOLDER

Shows many typical set-ups, and use on radial drills. Complete specifications on all models. Covers MONEY BACK GUARANTEE and 30 DAY FREE TRIAL OFFER.

MODERN MACHINE TOOL CO.
Jackson, Michigan

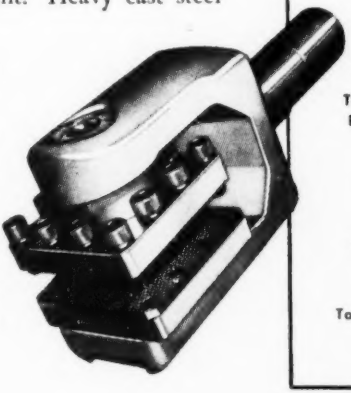
Perform FOUR operations...

from a SINGLE setup

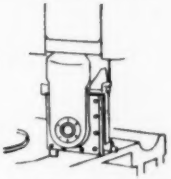
NOW, save more setup time than ever before possible! With this new Davis Tool Holder you can turn, undercut, bore and chamfer in one setup. You can mount four tools at once.

One simple wrench adjustment will change your position through 360° in accurately indexed increments of 45°. Two index pins and a center pin locate and clamp the complete assembly in rigid alignment. Heavy cast steel body assures accuracy.

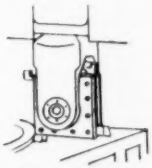
Increase your production with your present equipment . . . solve the age-old problem of too numerous setups, too many tool changes. For details on the Davis 8-Position Tool Holder, see your representative or write direct.



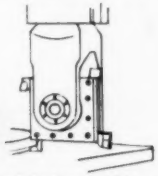
Typical series of operations on a single setup



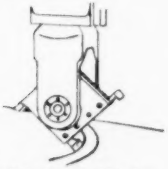
8-Position Tool Holder used in facing operation



Tool indexed 90° for undercutting operation



Tool indexed 90° to present turning tool



Tool indexed 45° for chamfering

If Davis can't bore it, it can't be done!

DAVIS BORING TOOL DIVISION

GIDDINGS & LEWIS MACHINE TOOL CO., FOND DU LAC, WISCONSIN

Builders of plain and micrometer adjustable block type boring tools; line boring bars; special boring tools; car wheel boring tools; planer, vertical boring and turning mill tools; Quick Change arbors and sleeves.

CUT COSTS WITH MULTIPLE BENDING

Whether you're bending pipes, tubes, reinforcing bars or structural shapes, you can greatly increase your bending production by multiple die bending.

Shown here is our Model A-5 BENDING MACHINE tooled for bending 3 different radii without changing the set-up. In order to make multiple bending cost no more per die than single bending, individual dies are merely stacked on the die spindle and a shoe of the proper width permits the same degree to be bent without changing the automatic reset switch. The MODEL A-5 will bend pipe up to and including 2" standard weight pipe.

Redesigned and greatly improved, the Model A-5 still sells for only $1975. F.O.B. factory, U.S. Funds.

Smaller and larger machines available.

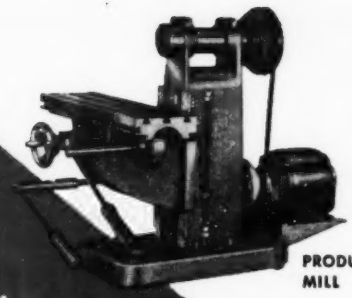
Write for detailed and descriptive folder.

PEDRICK TOOL & MACHINE CO.

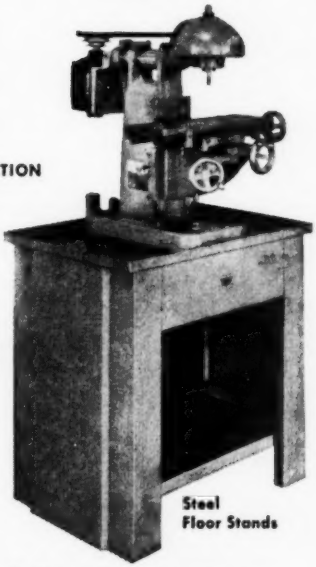
3640 N. LAWRENCE ST. **DEPT. 3**

PHILADELPHIA 40, PA., U.S.A.

These 3 precision Benchmasters make money in every shop!



PRODUCTION MILL



VERTICAL MILL

Steel Floor Stands

HORIZONTAL MILL

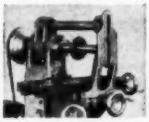
It's real economy to equip your shop with one or more Benchmaster mills. Why? Because these millers do small jobs with the same precision and speed as big, expensive mills. In fact, several small Benchmasters will even outproduce a big mill on work within their capacity! But consider the tremendous difference in investment and savings made! Set-ups are easier and faster. Operation is simple, cutting operator costs!

MILL HORIZONTALLY OR VERTICALLY WITH THE SAME MACHINE! Simply exchange spindle assemblies to convert. Production models with lever feed also available.

Full line of accessories for every milling requirement!

6" and 8" Rotary Tables

Swivel-Base Vise



Overarm Brackets

Arbors and Collets

Ask for complete information on Benchmaster Mills today! Benchmaster Manufacturing Co., 1835 W. Rosecrans Gardena, Calif.

benchmaster

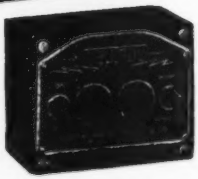
World's largest manufacturer of small punch presses and mills.

GAIN THE *Full Benefits of* MAGNETIC CHUCKING

NEUTROL

ELECTRO - MAGNETIC CHUCK CONTROLS

Release and demagnetize work pieces simultaneously. No time lost. No damage to work or to chuck faces. Protect chucks from voltage surges. Speed production.



Manual or Motor Control Models for 50 to 5000 Watts. Chuck area 60 to 7500 Sq. In. Special Models to Suit.

ELECTRO-MATIC RECTIFIERS

32 MODELS

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50 to 20,000 Watts

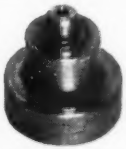
Engineered for dependable power conversion for industrial purposes. Most models equipped with automatic electronic *Time Delay Switch*, adding years to tube life. Quiet and efficient. Fully guaranteed.

Full Particulars Without Obligation

ELECTRO-MATIC PRODUCTS COMPANY
2235 North Knox Avenue
CHICAGO 39, ILLINOIS

How Warner & Swasey Automatics cut costs for Thor Power Tool Company

Take a look at some of the typical time and cost savings delivered by Warner & Swasey 5-Spindle Automatic Bar Machines at Thor Power Tool Co., Aurora, Illinois



REDUCTION GEAR BLANKS

Savings pay for several new machines!

Large variety required—in lot sizes of 150-1500 pieces. Material: 8460 Steel.

Previous method: 2 single-spindle automatics, running continuously.

NOW — one Warner & Swasey 5-Spindle Automatic does complete machining in equivalent of 4 days a week.

DRIVE SHAFT IMPACT SPINDLES

Accuracy and rigidity deliver 4 to 1 savings!

Material: Super tough rivet set alloy, especially made for Thor.

Previous method: Roughed on single-spindle automatic, straddled to length on turret lathe—both machines running at half speed.

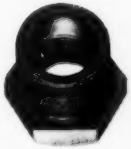
NOW — finished for grinding in single operation on Warner & Swasey 5-Spindle Automatic running at full speed.

THIN WALLED PROTECTION NUT

Combines operations at high removal rate!

Previous method: Three operations — rough turned, relief cut made in second operation, Class 3 threads hobbed in third. Cost of last step alone ran 20¢ per part.

NOW — finished in one operation in 132 seconds on Warner & Swasey 5-Spindle Automatic.



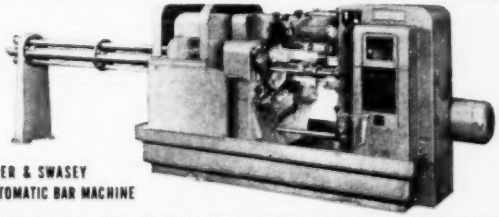
REDUCER BUSHING

Cuts Class 4 threads in same operation — costs reduced 8.5 to 1!

Previous method: Threads milled, following rough forming on single-spindle automatic.

NOW — Complete machining finished on Warner & Swasey 5-Spindle Automatic in one operation in 27 seconds!

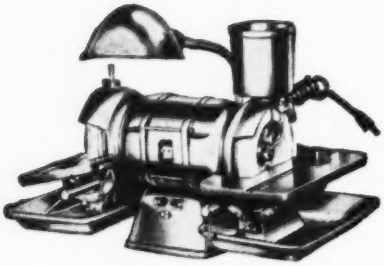
WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880



WARNER & SWASEY
5-SPINDLE AUTOMATIC BAR MACHINE

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

Baldor BALL-BEARING GRINDERS



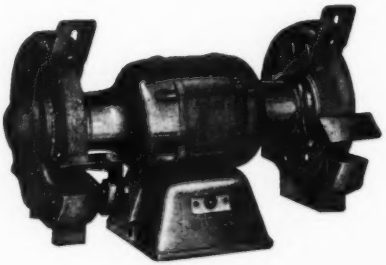
Clip this ad and mail for bulletins on Carbide Tool Grinder.

CARBIDE TOOL GRINDER FOR PRECISION WORK

The ½ hp motor that powers this Baldor Carbide tool Grinder has no commutator, no centrifugal switch, no brushes—a really trouble-free motor that will not burn out even when overloaded repeatedly. Electronically balanced within 1/50 ounce of perfection, the armature rotates at 3400 RPM without vibration—an engineering achievement that makes true precision work possible. Complete price, as shown. **$143.60**

NEW BALDOR W-I-D-E CLEARANCE GRINDER

Baldor is a basic manufacturer of Grinders - even the motors are built by Baldor. The new streamlined grinder, 8200 series, is excellent for grinding long and odd-shaped pieces as there's plenty of clearance between the wheels and the motor frame. ½ hp, 3450 RPM, capacitor-start, capacitor-run motor GUARANTEED 2 years against burnout. Baldor makes a complete line of 6"-12" general purpose bench and pedestal grinders. Complete price as shown. **$86.00**



Note exhaust type guards.
Ask for Bulletin 353

BALDOR ELECTRIC COMPANY
4353 Duncan Avenue **St. Louis 10, Missouri**

EXTRA inventory
EXTRA men
EXTRA service
at no extra cost . . .
YOUR B-RIGHT-ON
SOCKET SCREW
DEALER
Sure, you expect delivery and service from your industrial distributor, but you will find there's something EXTRA about the service from your Brighton Socket Screw Distributor—an extra interest in your fastener needs, extra desire and ability to fill those needs.
EXTRA INVENTORY—When you need socket screws, he has them or will get them quickly from centrally located factory stocks.
EXTRA SERVICE—When you need technical help on fasteners, he has at his disposal factory engineers, Brighton's field men, to help you.
EXTRA QUALITY—His line of Brighton Socket Screws is tops in quality, meeting the highest standards of strength, accuracy and uniformity.
Take advantage of all the EXTRAS your Brighton distributor offers. If you are not already acquainted, write for his name.
B-RIGHT-ON
THE BRIGHTON SCREW & MANUFACTURING COMPANY
1839 READING ROAD, CINCINNATI 2, OHIO

VALUABLE EQUIPMENT IN ANY SHOP . . .

HEAVY DUTY CHALLENGE WORK BENCHES

Challenge Work Bench featuring tool box shelf and steel drawer with lock.

Challenge Work Bench with tool box shelf.

Challenge Work Bench without shelf or drawer.

Whatever your requirements may be — there is a Challenge work bench to meet your needs. Each has a durable cast-iron top two inches thick — will not warp, shrink, splinter or burn. And every one has leveling screws to insure a perfectly level and accurate surface. Legs are strong and solidly braced.

A COMPLETE RANGE OF SIZES AND STYLES

Three styles as shown . . . ***Four*** sizes: (top dimensions) 28x48 and 28x60 with four legs; 28 x 72 and 28 x 84 with six legs. Write for details and prices. 707R

Challenge

TRADE-MARK ®

THE CHALLENGE MACHINERY COMPANY

Office, Factories and Show Room:
GRAND HAVEN, MICHIGAN

JIG GRINDING ACCURACY *guaranteed*

INFINITE CONTROLLED SPEEDS 30,000 TO 65,000 R. P. M.

Easily connect jig grinder to jig borer or mill

Then you can finish grind in hardened steel to "tenths" . . . jig grind dowel holes square with a ground base . . . move location of holes in hardened steel blocks . . . jig grind interchangeable holes in hardened sections . . . grind small holes with diamond impregnated mandrels . . . grind contours and relief with tungsten carbide burrs . . . grind radii in die sections . . . eliminate jig bushings in tools where close spacing is essential.

*Dependably accurate to "tenths"

Other infinitely controlled air driven spindle applications

Place spindle on most any machine. Use it for finishing contours on hardened steel working surfaces . . . burring or milling die castings . . . routing wood contours . . . carbide milling or finishing slots . . . finishing holes in hardened steel to "tenths" . . . grinding with diamond wheels, carbide burrs, or diamond impregnated mandrels.

Advantages—10 micro finishes using carbide mills . . . 6 micro finishes using mounted points, operates at any angle . . . air driven, air cooled, overheating prevented . . . speed controlled at optimum point . . . 3 3/16" long motor uses little working space . . . By controlling speed at any point you abolish need for many constant speed spindles.

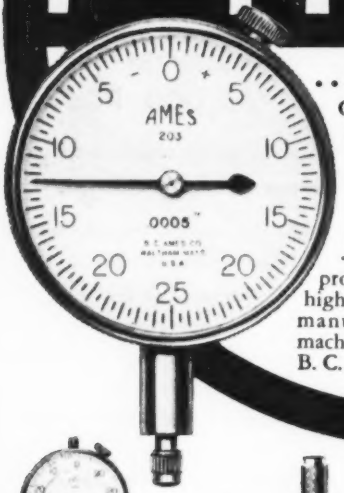
For immediate quotation please state machine tool application. Get this manual of photos showing operations Vulcanaire performs.

Vulcanaire

It's built by toolmakers for toolmakers

VULCAN TOOL CO., **HIGHLAND & LORAIN, DAYTON 10, OHIO**

AMES



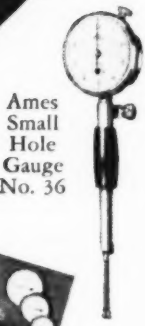
. . . the preferred Dial Indicators

One of America's largest and most famous mass-producers recently chose Ames as preferred source of supply for indicator gauges. They did because the four sizes of Ames "Hundred Series" indicators fit every measuring requirement; they are *accurate, sensitive,* low in friction, yet are *rugged* and *tough* —give *more* on-the-job time. All Ames products embody latest design and highest-quality materials; they are manufactured by methods and machines that are *exclusive* with B. C. Ames Co.

Ames
Dial Depth Gauge
No. 11C

Ames
Dial
Micrometer
No. 517

Ames
Amplifying
Dial Comparator
No. 26



Ames
Small
Hole
Gauge
No. 36

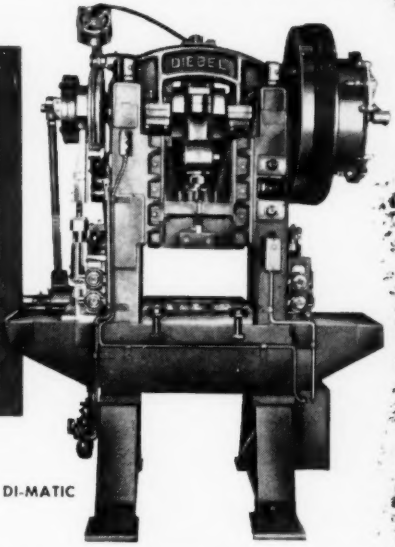
Send today for your free copy of Catalog No. 58

Representatives in principal cities. **B. C. AMES CO.** *28 Ames Street, Waltham 54, Mass.*

Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

Question

can you L-E-N-G-T-H-E-N your DIE life?...



40-TON DI-MATIC

Answer

Definitely yes—if you employ your dies in a press engineered with the dies in mind, a press designed to assure positive punch and die alignment, no press deflections, and negligible vibration and shock.

The life of any die—the quantity of stampings obtainable—is limited by a definite number of sharpenings. Increasing the number of stampings between grinds is the *only* way to lengthen die life.

The Diebel 40-ton DI-MATIC Press prolongs die life because of die conscious press engineering

- Cylindrically Shaped Ram, Precision Ground — guarantees perfect alignment of punch and die
- Crankshaft Supported by Four Bronze Bearings — assures greater press rigidity
- Keyed and Tie-Rod Frame Construction — eliminates press deflections
- Built-in Shock Absorbers — minimize vibration and die shock

also 5-TON
8-TON
12-TON DI-MASTER PRESSES

Investigate

DIEBEL PRECISION-BUILT AUTOMATIC PRESSES

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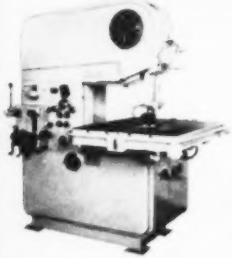
Di Machine Corporation 2712 W. IRVING PARK ROAD CHICAGO 18, ILLINOIS

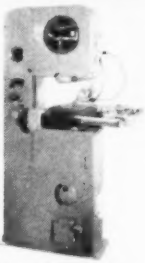
The Band Machine is as Basic as the Lathe ... for production Work

A BAND MACHINE FOR EVERY REQUIREMENT



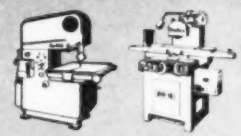
DoALL CONTOUR-MATIC—hydraulic operation. 40 to 10,000 blade feet per minute.

DoALL ZEPHYR—up to 15,000 feet per minute. 16" to 60" throat capacity.



DoALL CONTOUR—an all around machine for precision work.

DoALL UTILITY—low cost handyman for big and small shops.



MACHINE TOOLS

CUTTING TOOLS

GAGING EQUIPMENT

Splitting bearing castings on a DoALL Contour-matic, with a simple fixture bolted to the table. Automatic, hydraulic power feed table does the work. Operator simply puts work piece in position.

MASS PRODUCTION BAND MACHINING IS A MATTER OF SIMPLE FIXTURES

PRODUCTION costs are highly dependent on methods. Mass production band machining is a work method that has cut costs in hundreds of plants and very possibly can in yours. Slitting—slotting—stock removal prior to milling, shaping, turning and other operations—contour sawing to final shape and many other jobs can be performed almost automatically on DoALL machines with proper fixtures.

The above illustrations show three typical applications of production bandsawing. The opportunities are limited only by the ingenuity of the user.

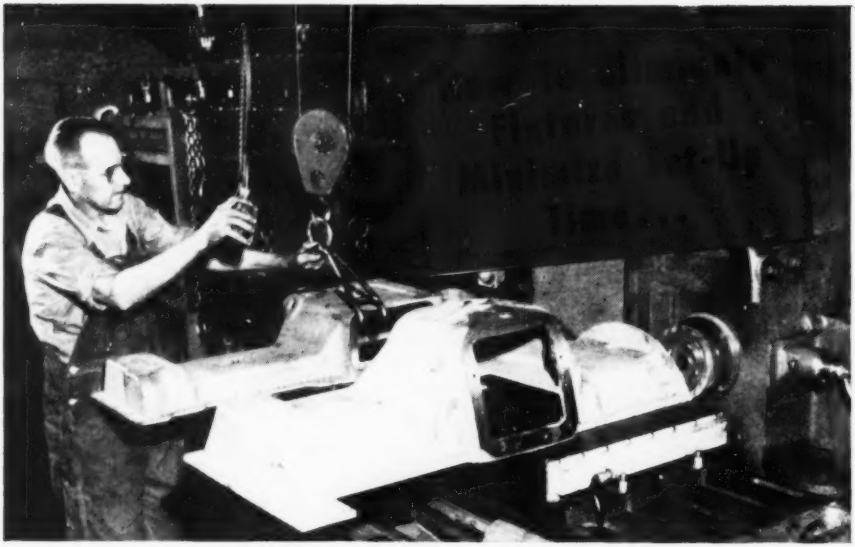
To lower costs, investigate bandsawing. ASK FOR LITERATURE. Call your local DoALL Sales-Service Store, or write:

THE DoALL COMPANY
254 N. Laurel Ave., Des Plaines, Illinois

INDUSTRIAL SUPPLIES

DoALL

B-195



With Sundstrand Magnetic Chucks

Here's how Caterpillar Tractor Co. uses Sundstrand magnetic chucks to eliminate fixtures and cut down set-up time. A pair of chucks are used as a permanent set-up for milling the bell end flange on 26 different oil pans. Prior to installation of the Sundstrand chucks, their pans required 7 different fixtures and from ½ to 1½ hours set-up time. With magnetic chucks, a throw of a switch will secure or release either or both pans instantly. If you have milling or grinding operations in your plant it will pay you to investigate Sundstrand magnetic chucks.

Free Data

Write for this new magnetic chuck bulletin — contains useful information on the complete line of Sundstrand Power-Grip Chucks. Ask for bulletin 435.

SUNDSTRAND
POWER-GRIP ®

SUNDSTRAND
Magnetic Products Co.
Division of Sundstrand Machine Tool Co.
1020-9th ST. • ROCKFORD, ILLINOIS

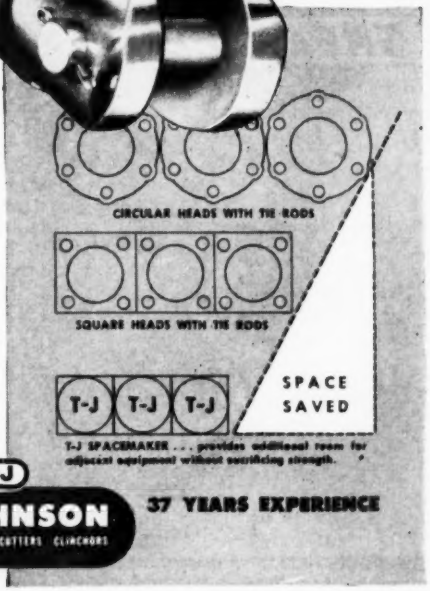
LESS SPACE!

extra high safety factor!

NEW T-J Spacemaker AIR CYLINDERS

These new T-J Cylinders *save up to 40% in mounting space*—with streamlined design that eliminates tie rods. They're *super rugged*—extra high safety factor . . . solid steel heads . . . heavy wall, precision honed, hard chrome plated, seamless steel body . . . leakproof cylinder head to body construction . . . heavy duty, hi-tensile, hard chrome plated piston rod.

Available with the new T-J Super Cushion Flexible Seals which insure positive cushion with automatic valve action for fast return stroke. Many standard sizes and styles . . . for pushing, pulling, lifting, clamping or control jobs. T-J dependability. Write for bulletin 8152. The Tomkins-Johnson Co., Jackson, Mich.


CIRCULAR HEADS WITH TIE RODS
SQUARE HEADS WITH TIE RODS
T-J
T-J
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SPACE SAVED
T-J SPACEMAKER . . . provides additional room for adjacent equipment without sacrificing strength.

4 Weeks Delivery on the Spacemaker —any style, any stroke, 1" to 3" diam.

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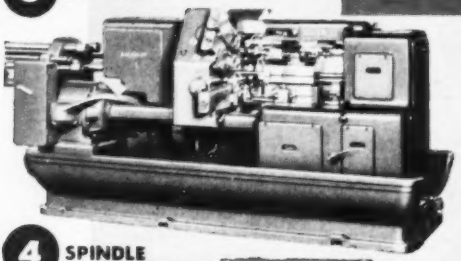
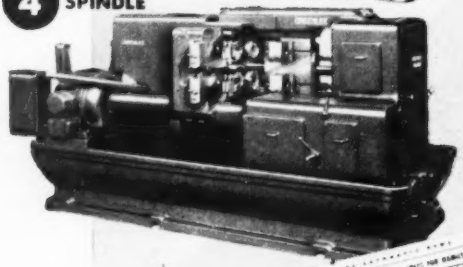
GREENLEE AUTOMATICS

6 SPINDLE



4 SPINDLE



Maximum economy of operation on long-run jobs, with an uncluttered, easily-reached tooling area that allows rapid and accurate positioning of tools and attachments . . . permitting precise inspection of work finish and tolerances *on the machine.* The Greenlee "Six" is available in 1", 1-5/8", and 2" capacity — the "Four" in 1-5/8" and 2-5/8" capacity.

PRODUCTION MACHINERY
GREENLEE

Automatic News

These free monthly issues are written expressly for those of you who are concerned with various phases of automatic screw machine production. They contain practical and informative articles dealing with tooling and maintenance, generously illustrated with drawings and photographs. If you wish your name added to our mailing list, send your request, on company letterhead, to:

The Editor, *Automatic News*

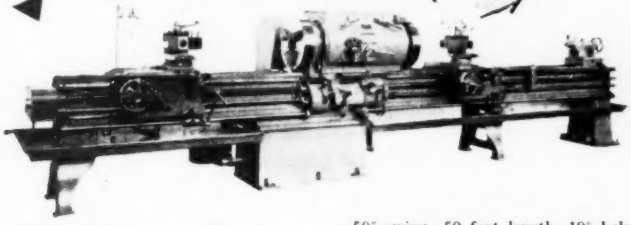
GREENLEE BROS. & CO.
1838 Mason Ave., Rockford, Illinois

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

WORK FROM Both Ends with...

LEHMANN LARGE HOLE DOUBLE-ENDER HYDRATROL LATHES

18" x 13 foot x 6 foot Double-End Hydratrol, hollow spindle, Engine Lathe; with 7⅛" hole in spindle; having hardened ways and a 10" long spindle extension. Equipped with carriages on both beds. Arranged for power feed and thread cutting. Tailstock for additional work between centers.



Double-End Hydratrol Lathes are built in sizes from 18" with holes up to 7⅛" to larger sizes with holes to suit the job. Double-End operations avoid necessity for resetting the work, and insure relative concentricity of boring and turning operations and squareness of faces at both ends.

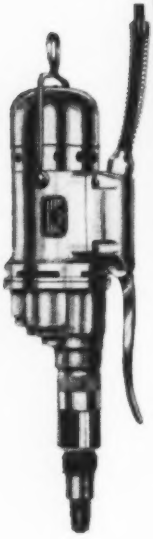
50" swing—50 foot length, 19" hole in spindle. 24" Hexagon Turret on carriage with profile bar for profile boring and grinding. Retractable diamond profile wheel dresser. Weight 72,000 lbs.

LEHMANN MACHINE COMPANY
GRAND at CHOUTEAU • ST. LOUIS 3, MO.

DIVISION OF NOVO ENGINE CO.

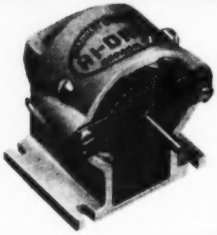
Boring Tools by Lehmann

NO. 6 IN A SERIES
OF CASE HISTORIES
Illustrating how Millers Falls "Adjustomatic"® Clutch Electric Screw Drivers cut time and cost of thousands of assembly lines.



OUTPUT JUMPS 110%

with Millers Falls "Adjustomatic"® Clutch Electric Screw Drivers



"Hi-Drive" — big name in midget motors — manufactured by Blake Manufacturing Division, Ray-O-Vac Company.

Driving tiny, self-tapping screws in a thin plastic housing — it's the kind of job usually considered too delicate for power drivers.

Yet, Millers Falls No. 52's with the *patented* "Adjustomatic" Clutch are performing this operation speedily, accurately — without splitting the plastic walls — without stripping threads. And — producton has more than doubled.

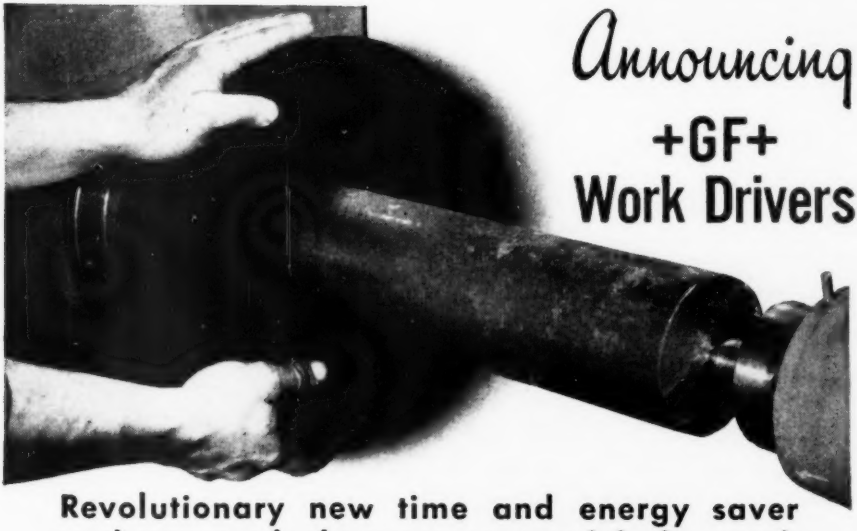
Ruggedly-built, vibrationless, power-packed, these remarkable drivers have a velvet touch. Torque adjustment can be set within inch-ounces — and stays put month after month.

MILLERS FALLS TOOLS
since 1868

The Mark of Superiority

If you want to speed up your own driving operations, write for full details on the Millers Falls broad line of high-production "Adjustomatic" Clutch Drivers — or let us arrange for a convincing demonstration.

MILLERS FALLS COMPANY
Greenfield, Mass.



Announcing +GF+ Work Drivers

Revolutionary new time and energy saver replaces work dogs on centered lathe work

—SAFER—FASTER—

Work Driver with hood removed

Skinner is proud to announce its appointment as exclusive distributor for the George Fischer line of patented lathe work drivers. The +GF+ consists of 3 eccentric jaws (6 on largest size) which have floating spring action to accomodate smooth or rough bars and forgings. A smooth protective hood covers all mechanism, and also acts as a manual opening and closing device for the jaws. A slight turn of this hood opens the jaws, and holds them open, until work is placed between centers—another turn releases the jaws to grip the work. Any increase in tool pressure and spindle speed automatically increases the holding power of the +GF+. Jaws are easily reversed to accommodate direction of spindle rotation. Skinner carries a complete stock of +GF+ drivers and replacement parts.

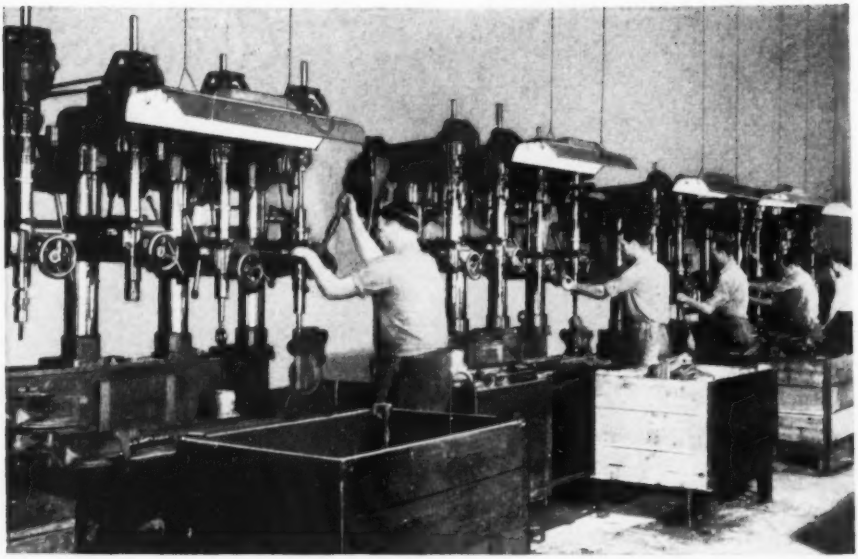
Write Skinner or your nearest Skinner distributor for new illustrated folder giving complete details!

NOTE WIDE RANGES!

Type 36 — 1/2" to 1-7/16"
Type 60 — 5/8" to 2-3/8"
Type 90 — 5/8" to 3-5/8"
Type 140 — 7/8" to 5-5/8"
Type 200 — 4-7/8" to 8-1/16"

THE SKINNER CHUCK COMPANY

207 Edgewood Ave., New Britain, Connecticut



EASY WAY To Hit Peak Production !

In this well-known meter plant, as in hundreds of efficient shops, they're jacking up drilling output this simple way: install the easy-handling multiple spindle "Buffalo" Drills your operation requires. You not only eliminate waste setup motions, but you get better accuracy, less worker fatigue and longer drill life.

In the phcto above, the men on the four-spindle "Buffalo" No. 22 Drills are able to set up as many as four different drilling, tapping and reaming operations. Production flows right down the line easily and with minimum delays between operations. All controls and adjustment cranks are easily reached, so that these large-capacity machines are as easy to handle as smaller sensitive drills. Let us recommend a drilling arrangement to help cut your drilling time and cost!

MULTIPLE SPINDLE "Buffalo" No. 22 DRILLS

"Buffalo" MACHINE TOOLS

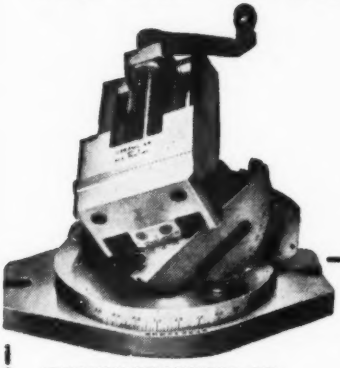
BUFFALO FORGE COMPANY

161 Mortimer St. Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING CUTTING SHEARING BENDING

PICTURE OF ANGLE JOB SETUP WITHOUT



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UNIVERSAL VISE

Speedy, precision angle set-ups are simple, fast and economical when you use Wesson's 3-way Universal. Wesson angle vises eliminate many costly special fixtures.

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For legible permanent marking of metal components use engraved lettering tools. Precision engraved dies and inserts for indenting or embossing identification on your parts will

1. Improve appearance.
2. Advertise throughout life of part.
3. Facilitate reordering.

Write for free catalog on Production Marking Equipment.

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- **Hand Stamps**
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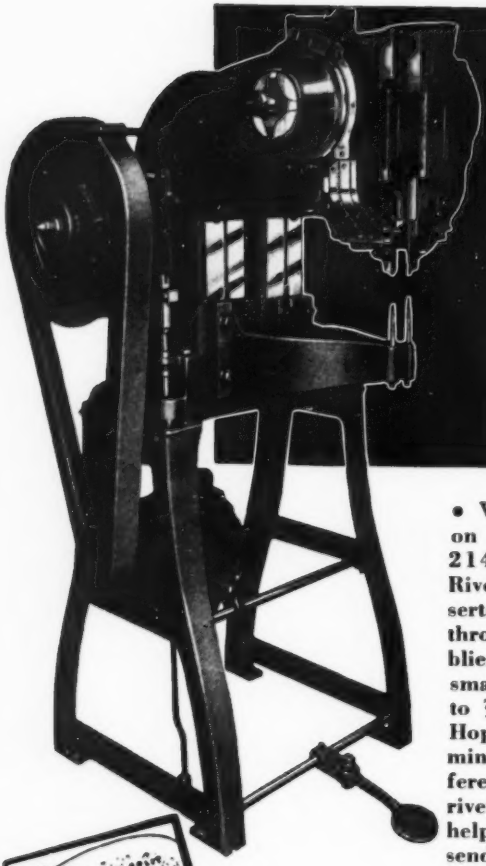


LOWER THE BOOM ON COSTS

SET RIVETS FAST

2 at a time with the

Chicago "214"

• With every press on foot pedal Model 214 Chicago Double Rivet Setter automatically feeds, inserts and clinches *two* rivets. 14-inch throat accommodates large assemblies. Handles 9/64" diameter or smaller steel tubular rivets — lengths to ⅞". Quick Change Rotary Type Hoppers and Raceways permit 5-minute changeover to rivets of different size. Adjustable anvils and riveting centers add to versatility. For help with fastening problem . . . send sample assembly (or a blue print) for free fastening analysis.

FREE CATALOG *contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.*

Chicago Rivet & MACHINE CO.

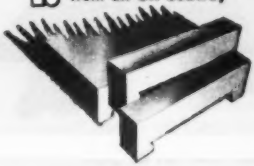
9610 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois

Branch Factory: **Tyrone, Pa.**

HOW HARD are OK hardened ways?

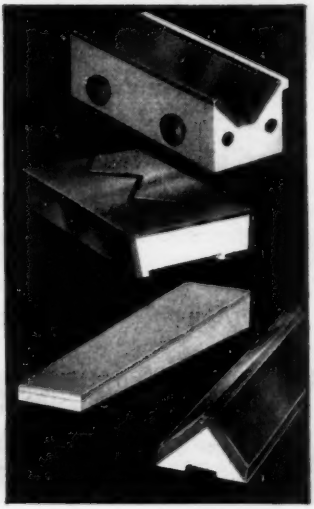
ONE CUSTOMER SHOWED US BY:

1. Taking a section from an OK bedway



2. Making it into a "tool bit"

3. Then cutting metal with it (1045 cold rolled steel)



The Gisholt Machine Co., Madison, Wisconsin, who use Ohio Knife bedways exclusively on their ram and saddle type Turret Lathes, made the above dramatic test for one of their customers. RESULT—another sale of a famous Gisholt Turret Lathe.

This super uniform hardness on the wear surfaces to a depth of 3/16" (64-66 Rockwell "C") is the reason why more and more OK ways, gibs, races, etc., are being specified on new equipment and used as replacements where former parts have failed. OK ways are practically wear proof assuring constant accuracy throughout the life of your machine. Enjoy with many prominent machine tool builders and users, the long wearing, supreme accuracy, super hardness of OK ways. Many sizes, shapes, etc., available, or made to your specifications.

OK wear strips are now available in welded Ampco bronze.
(Reg. U. S. Pat. Office by Ampco Metal Inc.)

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SLITTER KNIVES • SHEAR BLADES • ROTARY SHEAR KNIVES
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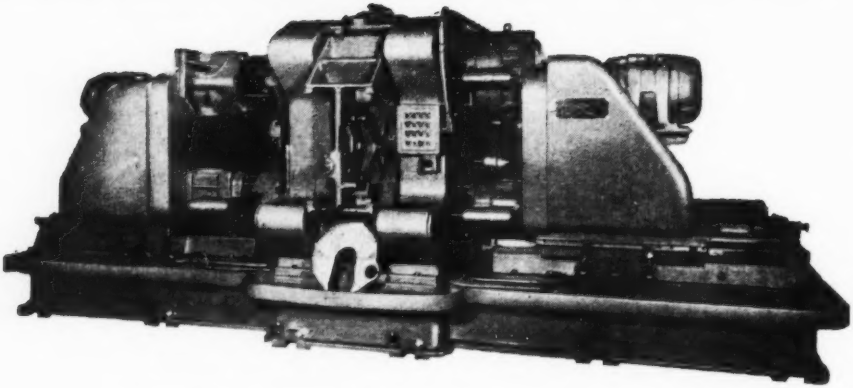
GO WITH HIGH SPEED

THE OHIO KNIFE CO.

CINCINNATI 23, OHIO

SPECIAL DOUBLE-END DRILLING, BORING and TAPPING MACHINE



Illustrated is one of the special machines we are constantly building, in addition to our line of MULTIPLE DRILL HEADS, to meet the specific requirements of plants, large and small. This machine is used for drilling, boring and tapping the adapter plate on an automatic transmission . . . The part is completely bored, drilled and tapped on this machine. We are using two of our Standard HH-20 Horizontal Way Type Units with an Automatic Index . . . The complete cycle is 30 seconds. The part is clamped with hydraulic cylinders.

We solicit your inquiry as to any special drilling, milling or boring operations you may have.

MICHIGAN DRILL HEAD CO.

971 E. EIGHT-MILE ROAD • HAZEL PARK, MICH.

hendey lathes are better built...

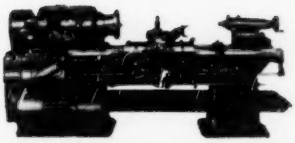
FOR LONGER, MORE ACCURATE LIFE!

And here's how it's done — Hendey starts with quality design and follows through with quality workmanship. Take the hardened and precision ground bed ways, for instance. Hendey does this differently *and better!* First, the world's most modern induction hardening equipment uniformly hardens the ways. Next, the precision machined legs and chip pan are attached to the bed (and they are never removed thereafter). Ultra precision grinding follows. Exacting checks for accuracy are then followed by electronic testing for hardness — uniform hardness — there are no soft spots in a Hendey bed — and a customer's test sheet proves it!

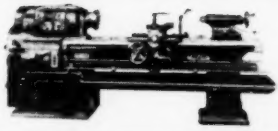
Add to this, quiet headstocks, the finest of lead screws, simplified, convenient controls and the ruggedness and power essential for modern precision turning.

Hendey lathes maintain the Hendey tradition for quality and accuracy. And there is the *right* machine in the Hendey line to suit your precision turning requirements. Write for details.

Featuring uniformly hardened and precision ground bed ways.

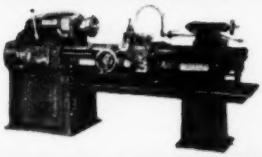


18" – 20" – 24" 12-speed Geared Head Lathes



12" – 14" – 16" 18-speed Geared Head Lathes

12" – 14" – 16" 12-speed Geared Head Lathes



No. 2 General Purpose Lathe

No. 1 General Purpose Lathe

9" x 24" Tool & Gage-Makers' Lathe

HENDEY

the Hendey machine co., inc.

torrington, conn., u.s.a.

——precision machine tools——

distributors in principal cities

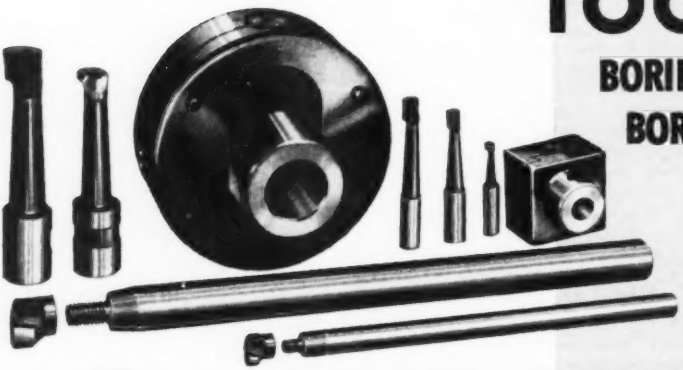
for more *Accurate* cuts...

greater *Rigidity* in

BORING TOOLS

BORING HEADS

BORING BARS



Use CRITERION

BORING EQUIPMENT

BORING PROBLEMS? CLOSE TOLERANCE?

Try Criterion Boring Tools. Built with the same care and quality as the time-tested Criterion Boring Head.

THIS COMBINATION WILL PRODUCE RESULTS.

Boring heads from 1½ to 7 inch diameter. Boring tools, carbide or high speed steel, ⅜ to 1¾ inches diameter. Bore holes from ⅛ to 20 inch diameter.

Accuracy for the closest tolerance • Rigidity for the heavy cuts • Heat-treated parts for long wear

LARGE OFFSET SAVES TIME AND TOOL CHANGES

These tools will cut your boring costs.

See the complete line of CRITERION TOOL PRODUCTS at your local dealers or write for free catalog.

CRITERION
MACHINE WORKS

9312 SANTA MONICA BLVD • BEVERLY HILLS, CALIF.

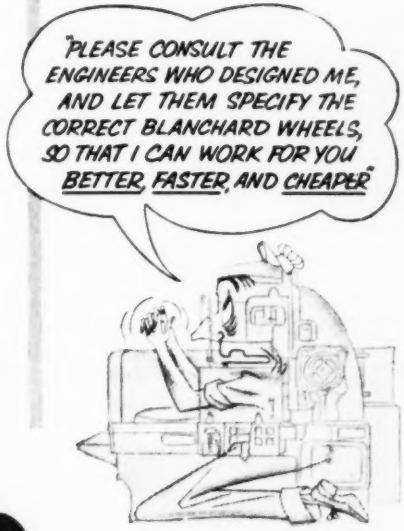
UNCLE!

Are your machines begging for mercy because of misuse?

Blanchard Grinders, *with proper grinding wheels*, *can* and *do* give high production with extremely close tolerances for dimension and flatness. However, a No. 11 Blanchard user recently received erroneous advice on abrasive wheels from an outside source. The result was that 35 high-speed cam plates were ground on both sides in 1¾ hours with surface finish of 24 micro-inches.

By referring the problem to Blanchard, it was easily demonstrated that the No. 11, with correct grinding wheel, would give desired results—90 to 100 cam plates per hour, with surface finish of 4 micro-inches, dimension tolerance of ±.0002, and flat within 2 light bands.

Blanchard wheels are best for Blanchard Grinders — let Blanchard give you the benefit of their vast experience so that you too can get the most from your Blanchard machines.


"PLEASE CONSULT THE ENGINEERS WHO DESIGNED ME, AND LET THEM SPECIFY THE CORRECT BLANCHARD WHEELS, SO THAT I CAN WORK FOR YOU BETTER, FASTER, AND CHEAPER"

Information on correct surface grinding procedure and wheel selection are given in "Work Done on the Blanchard" and "The Art of Surface Grinding." Write for free copies today!

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY 64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

Take the advise of one who knows!

When you replace your old Spindle or when you order a new Surface Grinder

specify

WHITNON SPINDLES

Heavily spring preloaded to keep spindle radially and axially rigid. — Stock Spindles are one full horse power, 3600 RPM enclosed motor, 220/440 volts, sealed in lubrication.

Sparks out fast leaving an excellent finish. — The only spindle rigid enough for crush dressing and perfect contour grinding.

Constant adjustment from spring preload keeps spindle rigid regardless of wear or temperature change.

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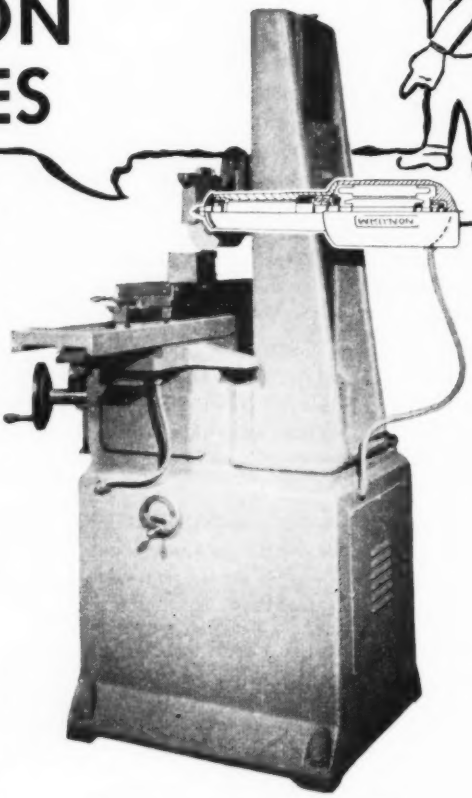

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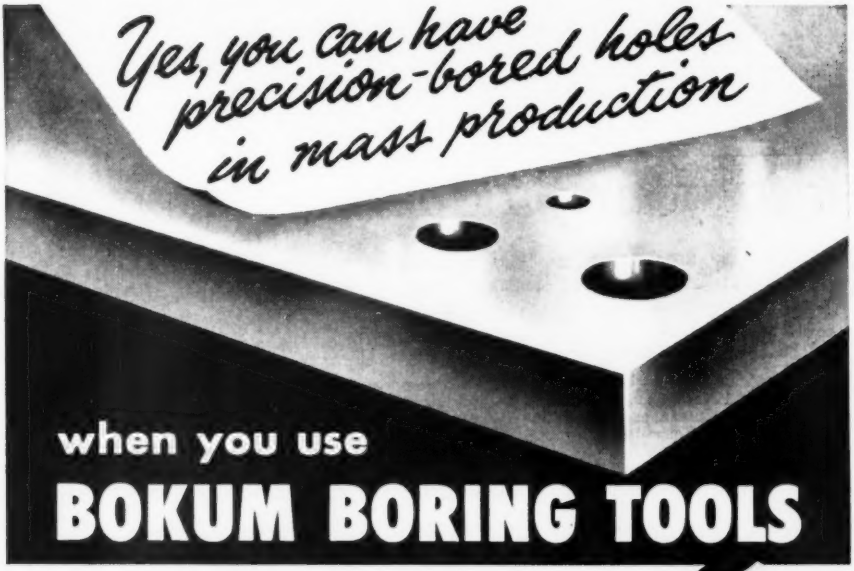

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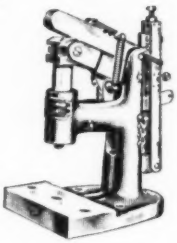

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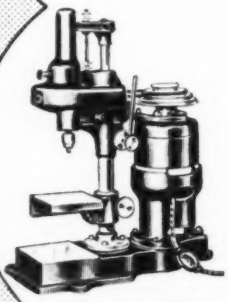

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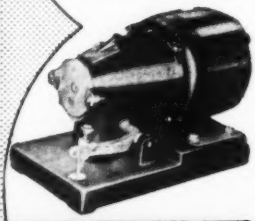

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IN THIS ISSUE

Good Fixtures Expedite Arc Welding of Heavy Assemblies 155
Big Economies on Small Runs Using New Model Automatic Screw Machine 175
Modern Furnace Brazing Practice . . . part 2 192

Good Fixtures Expedite Arc Welding of Heavy Assemblies, by Wm. T. Potter, Supt., Gar Wood Industries, Inc. Welding fixtures have proved their worth on several scores at the Mattoon, Ill., plant of Gar Wood Industries, Inc. Simple and inexpensive, they reduce costs and setup time as well as welding time for the fabrication of heavy components of earth moving equipment. Some employ hydraulic clamping to produce just enough camber to counteract distortion and save straightening. Page....155

Tooling Material Standardization, by Fred M. Burt, consulting engineer. The elimination of from 35% to 40% of the different types (brands and specifications) of tooling material carried in inventory, accompanied by a considerable increase in the variety of sizes and shapes, has been the result of the new tooling standardization and control plan at Northrop Aircraft, Hawthorne, Calif. In this article, Mr. Burt gives in detail the system worked out there. Page 162

Big Economies on Small Runs Using New-Model Automatic Screw Machine, by George Medlin, Foreman (automatics) Parker Aircraft Co., Los Angeles, Calif. In the valve division of this west coast plant, it is said that they're able to show production gains up to 300% when work, formerly assigned to manually-operated turret lathes, was set up on the shop's six new Brown & Sharpe No. 4 automatic screw machines. By deploying a few machinists over a number of automatics, it was figured that it was possible to realize upwards to 135% efficiency while running notoriously inefficient short orders. Page 175

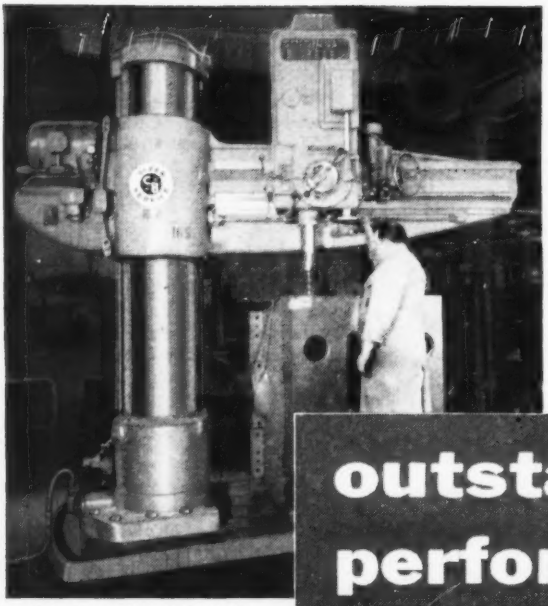
Milling Setup for Worm Wheels, by Tom Brown, consulting tool engineer. This valuable article explains in detail how the teeth in worm wheel blanks can be cut in one operation without any necessity for preliminary gashing. The worm wheel blanks discussed are of the annular ring type and cast in bronze. Page 185

Modern Furnace Brazing Practice, part 2, by H. M. Webber, Industrial Heating Dept., General Electric Co. This popular subject is treated further in this article by an expert. Some of the subjects discussed include: fits and clearances; parent metals; cleanliness; the brazing metals; fluxes; form and location of brazing metals; physical properties; furnace brazing equipment. Page 192

Mechanical Counters Aid Production Control, by Francis A. Westbrook. One of the most useful of the mechanical counters is the predetermined type of counter which is readily installed on existing machines. It is designed to make or break a contact when the present quantity of production has been reached, signalling the operator or stopping the machine. Here the author shows how it is possible to figure piece work earnings, keep track of production and how to control it, and also how the foreman or operator can see at a glance whether the machine is operating at full efficiency or not. Page 214

What Method Do You Use to Figure Overtime? by Robley D. Stevens, management consultant. This former law enforcement agent of the Wage-Hour and public contracts divisions shows where many foremen unwittingly add sizeable amounts to the overtime bills of machine and tool shops if they fail to take advantage of the official methods of computing overtime pay. Page 229

Modern Roll Grinding (Special Report) by Peter C. Dooley, the Carborundum Co. The thirty-second in a series of special American-built tool reports, this timely and well-written article shows and tells how roll grinding is no longer a mystery or closely guarded craft, but that it is very different, in many respects, to ordinary cylindrical work. The peculiarities, problems and abrasive requirements of roll grinding are treated here by an expert. Page 247



Photos courtesy Henry & Wright Mfg. Co., Hartford, Conn.

This 350 ton Dieing Machine is produced at the Henry & Wright Division Fmhart Mfg. Co., Hartford, Conn.

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AS THE *Editor* SEES

Let's Get Going

Last summer I called on a business man. I had no more than entered the office when the Great Man greeted me with a mighty blast about the blankety-blank Administration; you know, just as though it were all my fault! A half hour later I stood foolishly outside on the sidewalk without having stated my business or having had a chance to inject even a minor comment. "Nice we could have this chat," he said. And that was that.

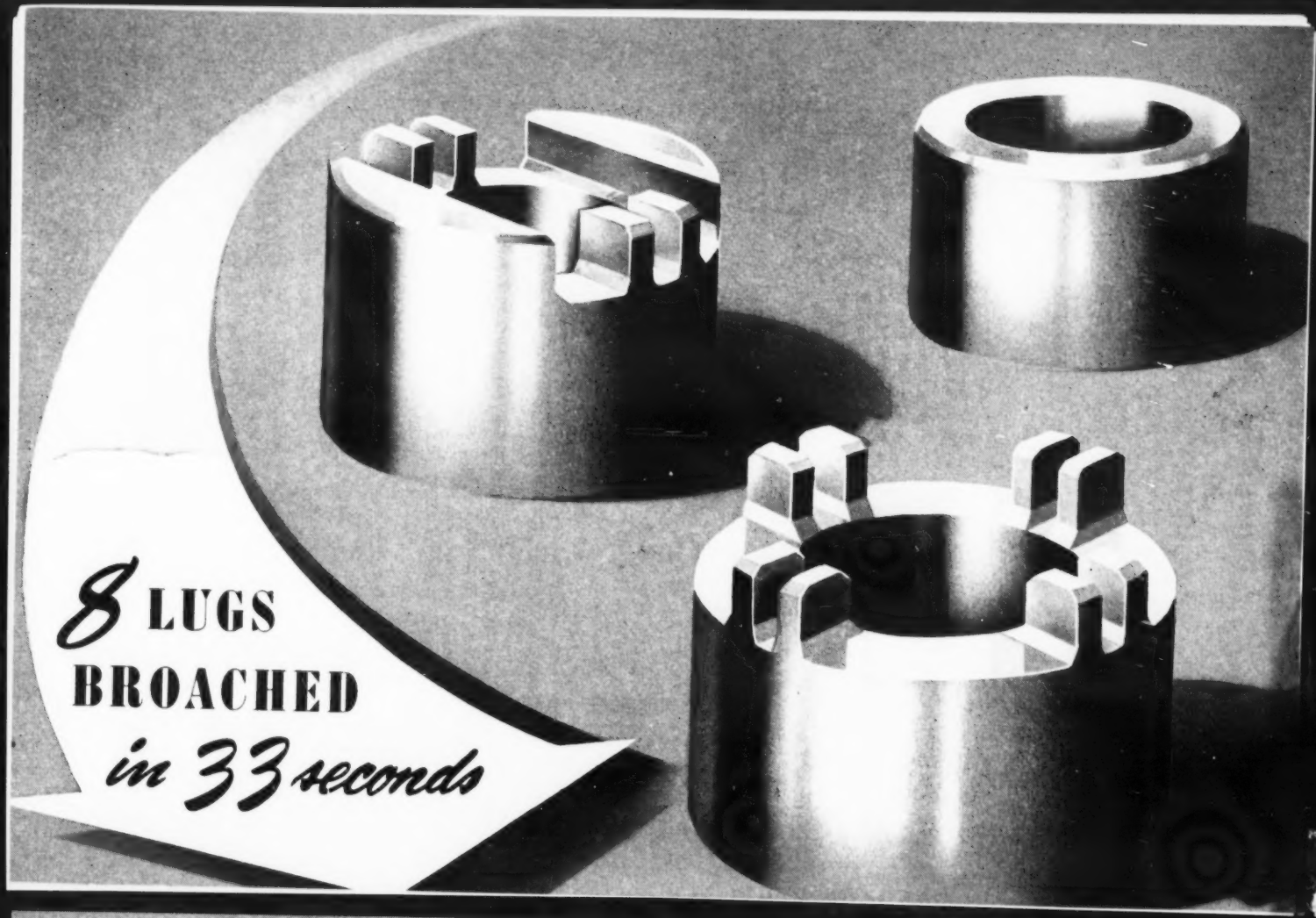
Feeling ran high against the Administration!

Today, a year later, you're likely to get a blast about, "When will things be organized in Washington? When will we get going?" Many businessmen think the new Administration should get its feet apart a little faster and begin making a few changes. It's human nature to be impatient, to want a change now instead of tomorrow; like my little boy who asked me the other day why Christmas didn't come next week.

We forget that nature changes from spring to summer and from autumn to winter slowly and imperceptibly. The change cannot be arrested, nor can anyone point a finger to a day and say, the change is here. Governmental changes have much in common with the turning of the seasons: they are slow, imperceptible but nonetheless certain. For us, sitting on the sidelines, it is impossible to appreciate fully the enormity of the Administration's job. It must not only propose new policies, get them accepted by Congress, execute them properly, and finally please everyone, but it must also sweep out or correct old policies.

The situation is made more difficult by the fact that commitments made by the previous Administration must be honored; in other words, the present Administration cannot set its own policies and implement them because of inherited laws and regulations. Balancing the budget, for example—it's an utter impossibility this year because of previous commitments. Hiring new help or getting rid of the old—can't be done efficiently or completely. Cutting taxes—a wild dream, due to the inherited unbalanced budget. What about our foreign policy—again, a hand-me-down mess. There is simply too much repair work on this house before we can think of building additions. The previous tenant was a bit careless about maintenance. Present tenant must see to that also. So we can go on and on. We chafe no more at the snail's pace of progress than do Administration leaders. We must be patient. After every winter comes the spring.

William J. Schlicher



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To produce eight single lugs on the end of a steel sleeve was a problem recently given to Detroit Broach.

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This is just typical of the specialized broaching techniques evolved by Detroit Broach for leading manufacturers. You, too, may have an application that can be materially reduced in time or cost by the economy of broaching or by review of present broach tooling. It will pay you to consult Detroit Broach for engineering or production data.

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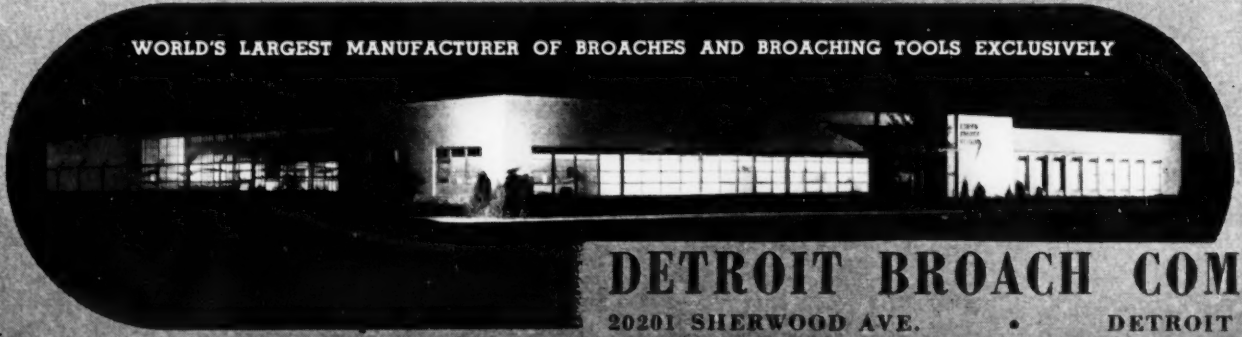

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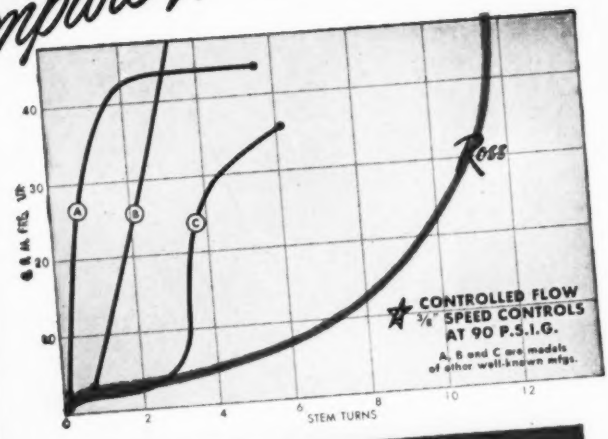

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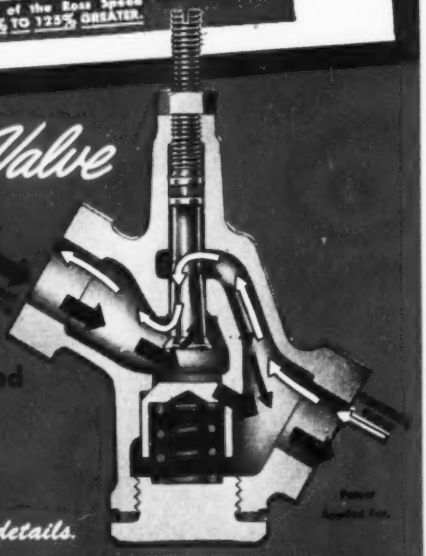

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LAST MINUTE WASHINGTON NEWS

★★★

by Arnold Kruckman

Washington Correspondent

Would Bolster Economy With $23 Billion WPA

What is the Administration and other leaders in Washington doing in relation to the subject of a recession? The other day one of the most high-ranking persons, in conversation with a New York banker, said of course there would have to be adjustments and a slowing up in certain segments of the economy, but that we had so arranged affairs in business and in banking and in government that what you would call a recession is impossible. These two pontiffs of the most elevated secular affairs of the nation very sincerely believe what they say regardless of what happens in Russia, or Asia, or Europe.

In case of an emergency requiring bolstering of the economy by the federal government we are told it can immediately throw into gear a public housing program with an expenditure of $1,083,705,000. This can be put into operation immediately, if there is need. In addition there is a tremendous need for new post offices and federal buildings, and for the rehabilitation of many of the buildings now in use.

It is pointed out a total of $23 billion for public works could be expended, and would be added to current defense expenditures, and to the normal civilian economy turnover, to provide sufficient support to take the economy over any depression that might occur. There are those of the old school, not quite so advanced in theory and thought as these others, who believe that a little caution is better than an overwhelming grief later. As for Russia, this school of thought regards it as dangerous but genuinely beset by internal convulsions. Obviously how these convulsions go will largely determine the immediate and long-term fate of Europe.

What happens to Russia plus Europe will profoundly affect the Near East, the Middle East and the Far East. The Arabs, speaking of them as a whole, are actively hostile to all Westerners. The ferment that boils among the Arabic people stirs the Asiatics who have, speaking broadly, lost their respect and their fear for the Caucasian Westerner.

Those who are best informed in Washington say that the series of very private dinners the President has been giving at the White House for the great of the nation chiefly are aimed

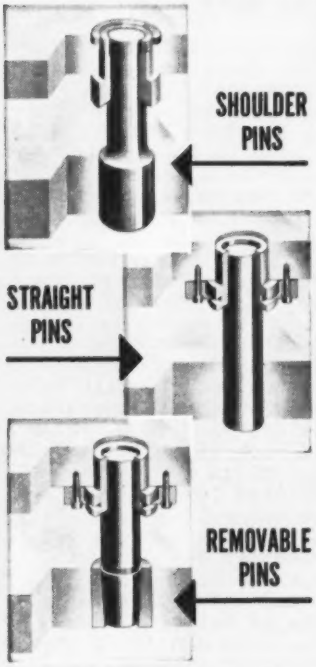
for boosting die output—

and reducing maintenance

Lamina

WATER-HARDENING STEEL

GUIDE PINS



Lamina Guide Pins give exceptional service, too. Made of water-hardening tool steel and precision lapped on the O.D., these quality pins not only wear longer but perform better. They completely eliminate the brinelling and "mushrooming" characteristic of case hardened pins when they are driven into the shoe. Note, too, the improved design of the removable pins which simplifies installation.

DISTRIBUTORS: A few desirable territories are open to qualified distributors. If interested, please write for details.

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Lamina Guide Pin Bushings are hardened steel with bronze electroplated on the inside diameter . . . it's the one bushing design that gives you the long wear life of hardened steel with complete freedom from seizing and scoring. Added to the free-running qualities of the bronze bearing surface, a double figure-eight oil groove keeps the pin and bushing properly lubricated at all times.

Lamina Guide Bushings are made in two styles illustrated above and in a number of diameters and lengths. As shown at the left they can be used with straight, shoulder and removable type pins. For longer press runs with fewer shut-downs, specify Lamina Guide Pins and Bushings.

Lamina Dies and Tools, Inc., 14925 W. Eleven Mile Road, Berkley, Michigan.

This new brochure gives complete information and sizes on Lamina Guide Pins and Bushings. It also illustrates many other Lamina dies, tools and die-maker's equipment. Send for your copy, there is no obligation.

Lamina

DIES AND TOOLS

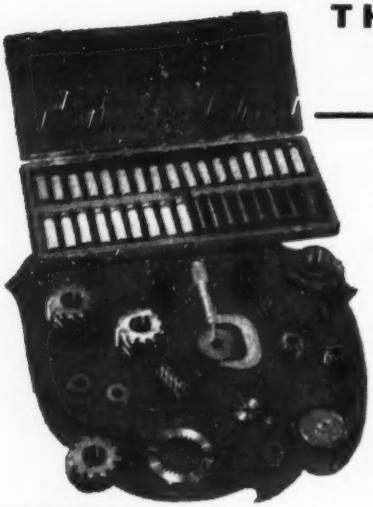
at getting their counsel in regard to these problems, especially to learn from them what they think should be done in the event of a slowdown of any kind. Recently Eisenhower had groups including Former President Hoover, Gen. MacArthur, Bernard Baruch and Cardinal Spellman.

Employment at the present time is practically at an all-time peak. Savings in the banks are the greatest ever recorded. Credit payments seem to hold up well. They tell us that practically everywhere, except in the District of Columbia, real estate values continue high. However, each monthly statement issued by the Federal Reserve Board, in an over-all sense, reports very slight declines. The latest word is that purchasing agents also detect caution and slower business action throughout the country.

The recurring suggestion at the plush private dinners in the White House is that a great and magnified WPA program should be prepared against the emergencies that may come in 1954. It is curious that these emergencies are less expected to occur as the result of the Korean truce, or a natural domestic business slow-down, than they are as the result of what may happen by reason of the dislocations stemming from the earthquake of revolt in Russia.

The reorganization of the Pentagon, which was fought so vigorously by many who fear more concentration of power in the central government, has set up one man, under the President, who controls the entire military machine as well as the industrial and civilian service apparatus that is a subordinate part of the military machine.

By the terms of Reorganization Plan No. 3, which became effective on June 12, the Office of the Defense Mobilization became a permanent unit in the executive office of the President. Several agencies of the Defense Department have been wiped out, as have other temporary civilian defense agencies, such as the National Security Resources Board. The functions of these Agencies have been transferred to the permanent Office of Defense Mobilization. There are many, who have defense contracts, who have felt there were too many emergency defense agencies which were wastefully duplicating services performed by others. On the other hand there are others who feel the growing concentration of controls over industry and the general economy in the military of the federal government is a grave mistake, and that it may lead to an emphasis on authoritarian privileges. They will tell you, and it seems true, that no Governmental function of any magnitude, either by the Congress or by the Executive and Administrative Agencies, is performed without discussion and determination in what is called The White House Conference. The White House Conference consists of the President, his assistant, Sherman Adams; other attaches of the White House; the Vice-President, the Speaker of the House; Majority Floor Leader Halleck; Rep. Leslie C. Arends, Vice-Chairman, House Armed Services Committee; Sen. Taft; Sen. Saltonstall, and Sen. Knowland. Occasionally they invite representatives of the Armed Services, and of the various civilian departments and agencies as the paramount subject for discussion may require. The White House Conference determines policy on the actions of government; it rules upon the priority of things to be done. It determines what legis-



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Set 26EX-Gear Measuring Wires, accurate to + or — .000025", for common diametral pitch external spur gears.

VAN KEUREN GEAR MEASURING WIRES PROVIDE THE MOST ACCURATE AND LOW COST METHOD OF MEASURING THE TOOTH THICKNESS OF SPUR AND HELICAL GEARS, INVOLUTE SPLINES AND INVOLUTE SERRATIONS.

ONLY . . . EQUIPMENT NEEDED:

1—SET VK MEASURING WIRES
1—MEASURING INSTRUMENT

Complete information regarding the use of Gear Measuring Wires is contained in a 50-page section of the Van Keuren CATALOG and HANDBOOK No. 35. Included in this section are:

. . . table of wire sizes from 1.92", 1.728", 1.68" and 1.44" series

. . . tables of wire measurement including change factors for standard external and internal spur gears of 14-½°, 17-½°, 20°, 25°, and 30° pressure angles and of from 5 to 500 teeth.

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. . . tables of involute tooth parts for standard addendum and stub tooth involute gears.

. . . information, formulas and examples regarding the wire measurement of helical gears.

. . . information and examples concerning the wire measurement of enlarged pinions and reduced gears.

. . . tables of wire measurement for involute splines.

. . . tables of wire measurement for involute serrations.

. . . tables of comparative measurement over three sizes of wires for use in involute profile checking.

CATALOG and HANDBOOK No. 35 is available without charge by writing to: The Van Keuren Co., 177 Waltham St., Watertown, Mass. Ask for your copy.

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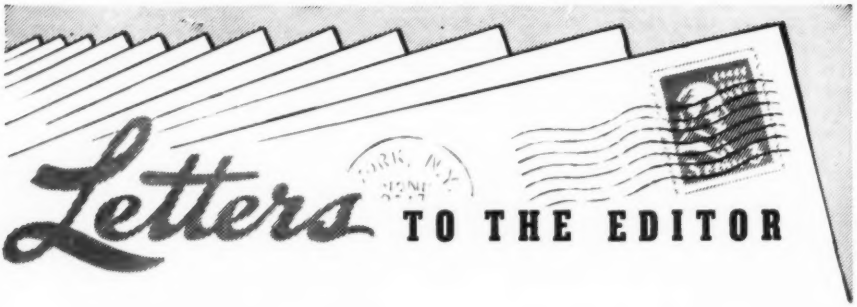
lation shall be released for consideration by the House and the Senate. It is generally understood in Washington that nothing of paramount importance can happen on the hill, or in the administrative departments and agencies, without prior determination by the White House Conference.

Some light on the potentials of business immediately ahead is pointed out by a report issued early in July by the Council of State Chambers of Commerce, through its research office in Washington. This is a very active and genuine and sincere organization which strives, with all its ability, to supply correct information and adequate evaluation to a large number of Chambers of Commerce in many different parts of the United States. The Research Director Eugene F. Rinta, an officer with foreign service during the second World War in the Army, and a former FBI man, is one of the most efficient investigators and fiscal research men in the country. In his recent study of the needs of the defense establishment he brings out clearly and sharply that the cuts and reductions over which senators, representatives and some military leaders have made so much alarming noise, in fact have done no harm, and have not reduced the great spending power of this part of the government. Mr. Rinta says: "The Trumen budget recommended $41.3 billion in appropriations to finance new spending commitments by the Defense Department in fiscal 1954, plus $132 million to liquidate prior year contract authority for naval vessels. After a four-months' review of the Truman recommendations, the Eisenhower administration submitted to Congress a revised military budget calling for $36 billion in new spending authority, plus the $132 million liquidating fund. Briefly, the detailed revisions of the Truman budget show the following: Army appropriations for three purposes were increased $1,690 million to provide for equipping additional South Korean divisions and to cover combat consumption of United States forces through fiscal 1954. These were not provided for in the Truman budget. The items increased were military personnel costs—$47 million, maintenance and operation—$720 million, procurement and production— $923 million. Reductions in a number of other items held the net increase for the Army down to $1,561 million. New funds for the Navy were cut for almost all purposes. The biggest cuts were as follows: procurement of aircraft and related items cut from $2,234 million to $1,400 million; maintenance and operation and procurement for the Marine Corps cut from $688 million to $452 million; and maintenance and operation costs of Naval vessels cut from $1,069 million to $938 million.

"It is the reduction from $16,778 million in new money proposed by Mr. Truman for the Air Force to $11,688 million proposed in the revised budget which has raised a storm of protest on Capitol Hill. Air force budget revisions totaled a cut of $5,090,000,000.

"So, with a $28.5 billion carry-over of unexpended funds and $11.7 billion of new funds, the Air Force would have had about $40 billion available for spending in 1954. This $40 billion total compares with a total of $17.5 billion which the Air Force planned to spend in 1954 in line with the Truman Budget recommendation and would still leave $22.5 billion for deliveries of aircraft, and other equipment, in subsequent years."



'Taint Procrastination, 'Tis Laziness

Saw a sign in a client's office the other day which read, "Who, if not you—When if not now?" He told me he'd gotten it from you after reading the editorial in the January BLUE BOOK. I read the editorial and wonder if I might have one of the cards.

While the card is apt, I don't think it's a matter of procrastination at all; it's a matter of just plain laziness. A guy will come to work with big intentions until he sees his work piled high. He knows it should be done, but just doesn't get around to it. He'll do it tomorrow . . . he's too lazy to do it today. Most people are by nature lazy. They don't want to work. They don't like to work. Laziness is at the bottom of all of our ills, economic as well as political. I think procrastination is a polite word, let's call it what it really is: laziness.

Incidentally, the quotation, "Procrastination is the thief of time," is from Shakespeare, not Edward Young.

George Althuler,
Kansas City, Kansas

A "Who and When" card goes forward to reader Althuler. I don't think there is anything in the world I'd argue about today. It's 101 degrees and sticky and moist to boot. That's hot for Chicago and I just can't get excited about a thing: not even the White Sox. Procrastination or laziness: what's the difference, reader Althuler, let's you and I go fishing and sit under a tree.

Incidentally, you bring the refreshments; the quotation is from Young and not Shakespeare to whom it has been wrongly attributed for years. The quotation is from "The Complaint." A few of the lines are:

Procrastination is the thief of time;
Year after year it steals, till all are fled,
And to the mercies of a moment leaves
The vast concerns of an eternal scene.

Cards Still Available

I would appreciate receiving three cards each of, "Who, if not you—When, if not now."

John Zakanycz, Incentive System Supervisor
Worthington Corp.

I would appreciate very much receiving several of your signs, "Who, if not you—When, if not now?"

R. Schempp, Asst. Mgr.
Sanderson-Halcomb Works
Crucible Steel Co. of America

I sincerely hope that I am not too late in requesting a copy of your card which received so much favorable publicity, "Who, if not you—When, if not now?"

Your book is very popular with this organization, but by the time it reaches me, sometimes several days have elapsed. However, I would be sincerely grateful for a copy of the above reference card.

Herman E. Lacy, General Manager
Helmco, Inc.

We just printed another batch of cards and are delighted to send them to all who request them.

Painted Castings Present Problem

My shop has started the practice of painting castings before they are machined; the reason, or various reasons, for this you probably know.

I find that the paint produces a compound and breaks down the land very quickly, especially on counterbores. We use high speed steel counterbores and I have tried various speeds and feeds, various degrees of clearances; namely, 7, 10, 15 degrees on the land. This doesn't seem to help.

It would please me no end if I found others who were having the same trouble and who had discovered a solution.

Neil A. McLaughlin
West Hanover, Mass.

It doesn't seem possible that the paint, a gummy substance, should be the cause of your trouble; I'm inclined to think the trouble lies in the scale of the castings. The only way this is overcome is by increasing the feed. However, a reader might have the answer for you. If anyone can help reader McLaughlin, I'll be delighted to pass the information along.

Foremanship Forum

Please send, if possible, April and May, 1952, issues of the BLUE BOOK which contain "A Blueprint for Manpower Mobilization," by Edmund Mottershead. These are parts 1 and 2. I should like to know if reprints of the entire series are available.

James Reagle, Methods Engineer
Joy Manufacturing Co.

Tear sheets of parts 1 and 2 have been sent to reader Reagle. No reprints of the entire series were made. As long as they lasted we sent out tear sheets from our monthly over-run. These have been completely exhausted and we're sorry to have to tell reader Reagle the only issues we have left are three file copies.

Special Reports on Drilling Machines Appreciated by Readers

I received the special reprint covering drilling machines which you mailed to me some time ago. This is indeed a very well written treatise on an important subject. I am sure it will be very helpful to us in training our new men in the handling of inquiries covering drilling equipment. While I know that this information was first published in the Machine and Tool Blue Book, I do feel that the reprints under one cover are very much worth while and will be extremely useful to us.

In this connection I would like to know whether it would be possible for us to secure a reasonable quantity of such reprints and on what basis. By reasonable, I mean about fifty copies.

My thought is that if we can obtain reprints of these articles on various machines at a reasonable cost, I could distribute them to all of the men in our division of the business, and I am sure that in that way we would get increased value out of these reprints.

About a year ago I obtained a copy of Volume 1, which is a paper bound book containing similar reprints of articles appearing during 1951. Do you plan to publish Volume 2 of this book during 1953?

No doubt you understand that ours is a machinery sales organization and our interest in these publications is primarily an educational one, but I can readily understand how these articles, reprints, etc., would be very helpful in industrial establishments using metal working equipment.

E. L. Younts, Manager
Machinery & Tool Division
Joseph T. Ryerson & Son, Inc.

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Phinney had one interesting experience that demonstrates the amazing versatility of this press. They received an order for a series of 4 progressive dies from a maker of tank parts. Phinney made the dies, tested them, and shipped them. A short time later the dies came back. They were excellent, but the customer didn't have a press large enough to run them. Would Phinney put the dies in production on the same Press that made the sample parts? Phinney accepted. And this same KRW Hydraulic Press has since turned out thousands of tank parts in addition to its regular work of testing dies.

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How's BUSINESS ?

Business in General

Business is up slightly over the first quarter. Increases apparent in most lines. Shipments of goods have increased which has contributed to a reduction in order backlogs. A still further rise in consumers' incomes is reflected in a flow of purchasing through trade channels.

An important basic influence is the continued strength in business capital investments. Note the chart on the next page: the most recent surveys show that investments in the second quarter of 1953, and plans for the third quarter, are higher than earlier anticipations.

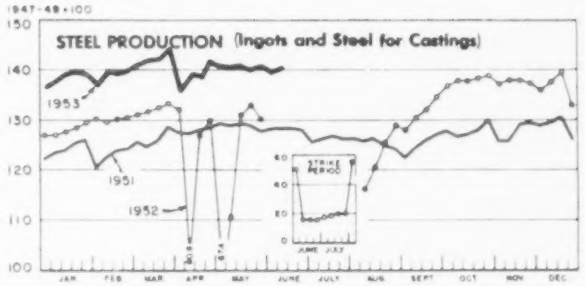
Consumer spending has advanced in the same proportion as income, after taxes of approximately 92 percent. Especially heavy has been the buying of durable goods. Automobile production reflects this surge. Passenger car production in the first half of this year passed three million. Consumer expenditures for automobiles are running one-third higher than in the first half of 1952.

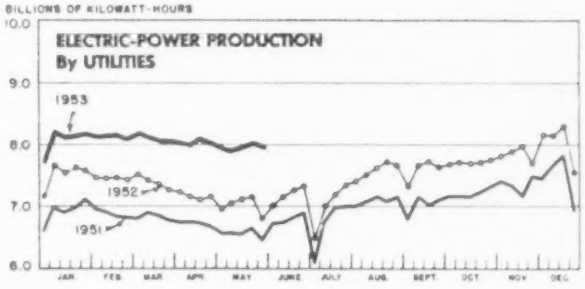
Capital Goods Demands Higher

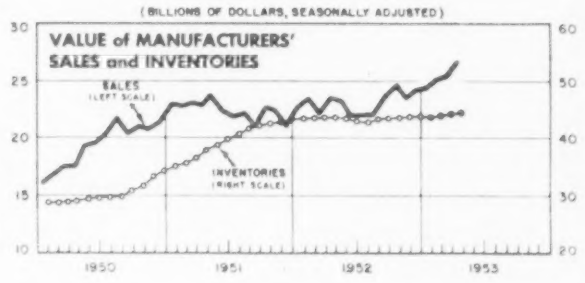
Business is planning to spend $28.7 billion in the third quarter on plants and equipment. This is slightly higher than spending in the first and second quarters.

Current Business Indicators

source: U.S. Dept. of Commerce







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Manufacturers have scheduled capital spending at rates of $13 billion in both the second and third quarters respectively. This compares to $12.5 billion in the first quarter. These programs for the first nine months of this year are about 7 percent above actual outlays in the corresponding period of 1952.

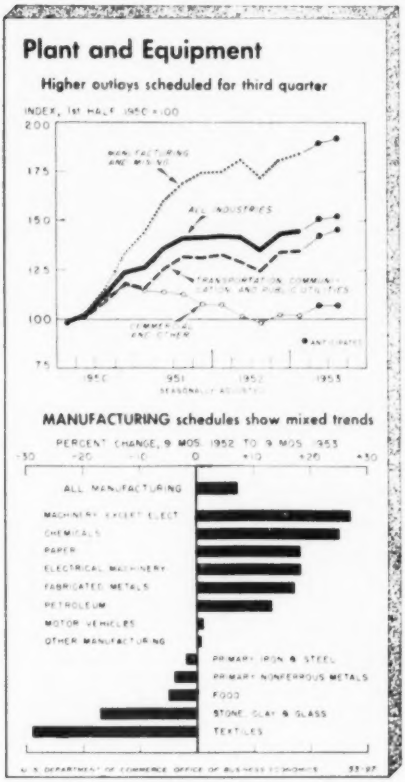
Rapid Tax Write-offs

Opportunities for small business concerns to obtain rapid tax write-offs for expanding production facilities in several industrial fields closely related to the defense effort were announced by the Small Defense Plants Administration.

The opportunities result from recent reappraisals by the Office of Defense Mobilization of four of the industrial expansion goals previously established, and the setting of three new goals.

The goals, in each of which a substantial portion is still open for rapid tax amortization certification to qualified small firms, are: coke, by-products, mining machinery, materials handling equipment, ordnance facilities, alkylate, and sensitive electrical switches. In addition, a new goal has been established by ODM for research and development laboratories, but SDPA explained this includes only those laboratories now holding defense research and development contracts and in which additional expansion is endorsed by an appropriate Government agency.

Small firms interested in expanding their facilities to assist in meeting the requirements of any of these goals, and who desire to apply for certificates of necessity permitting accelerated tax amortization, should file application Form DPAF-2 with the Office of Defense Mobilization, Resources Expansion Division, Washington 25, D. C.



Air Force Cuts Back . . . Small Business Not Worried

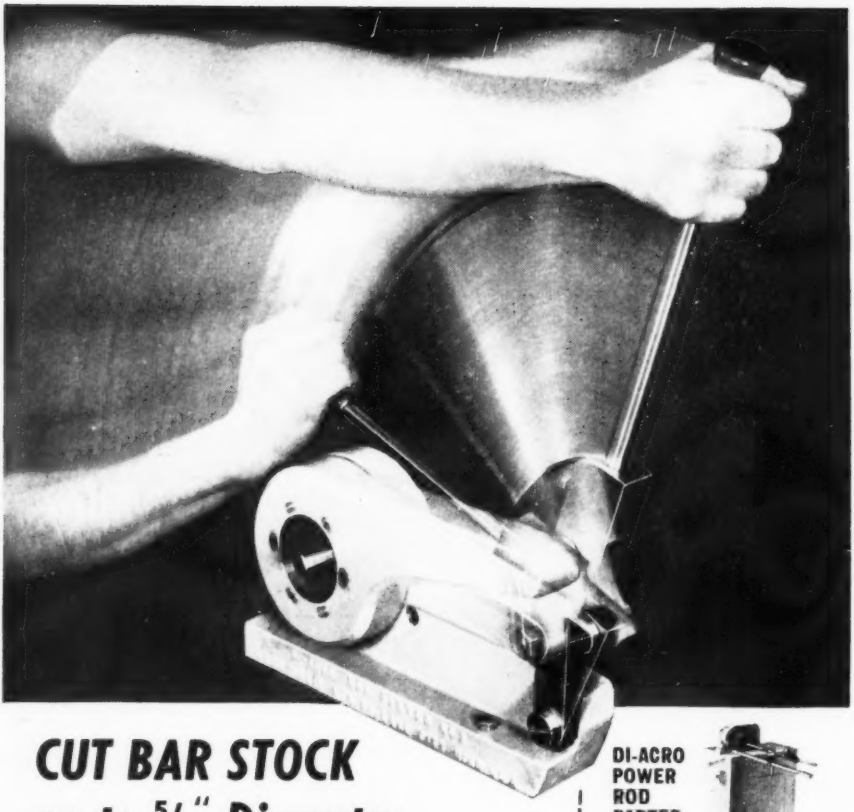
In spite of the proposed $5 billion budget cut in the Air Force small business subcontractors will probably not feel this cutback. They view the future with optimism. Reason for this happy outlook is the fact that the Air Force will have a carry-over of approximately $23 billion which has been appropriated but not spent by the end of June 30, when the current fiscal year ends.

While the majority of this $23 billion has been appropriated, several billion remain to be spent. The unspent amount is around $3 or $4 billion. Government spokesmen say the $5 billion cut will probably come from this $3 or $4 billion residue.

Further reason for optimism is the survey made by an Air Force research team who surveyed 97 large defense producers. These primary defense contractors anticipate subcontracting $8.1 billion, or 52 percent of their contracts. An estimated $2.4 billion is being earmarked for small businesses having 500 employees or less.

Heavy Press Program Cut

Seven units of the heavy press program were cancelled by the Air Force. Reason:



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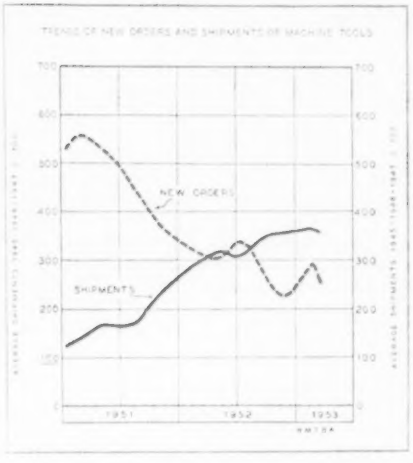
Index of new orders and shipments of machine tools

source: National Machine Tool Builders Association

Month	Domestic	Foreign	Shipments	Ratio Unfilled Orders to Demonstrated Production Rate
April	293.5	15.6	307.9	14.8 - 1
May	284.6	31.4	323.0	13.6 - 1
June	342.9	20.3	330.8	12.6 - 1
July	374.6	14.9	257.2	12.6 - 1
August	309.1	22.7	314.8	12.4 - 1
September	302.4	23.1	368.6	11.8 - 1
October	243.3	22.5	338.2	11.1 - 1
November	205.4	14.3	342.5	10.3 - 1
December	225.2	19.6	355.0	9.8 - 1
January	255.8	26.3	361.6	9.4 - 1
February	282.1	22.9	354.5	9.0 - 1
March	323.3	17.5	375.7	8.5 - 1
April	276.8	13.9	372.7	8.0 - 1
May	p. 247.2	p. 15.0	p. 359.0	p. 7.6 - 1



too many were being built and too many problems remained unsolved regarding the presses being cancelled. The seven presses totaled 168,000 tons. Forging presses cancelled hit E. W. Bliss, 35,000 and 25,000 tons; United, 35,000 tons; Baldwin, 25,000 tons. Extrusion presses cancelled: Loewy, 20,000 and 8,000 tons; United, 20,000 tons.

New High in Electric Energy Production

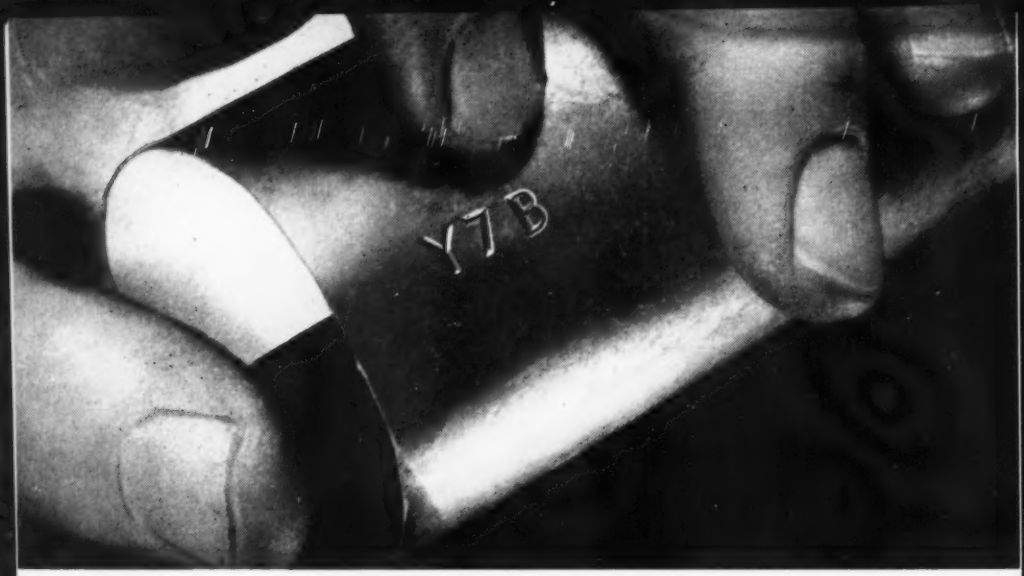
High production and extremely hot weather boosted U. S. electric energy output to a new high for the week ending June 27. Kilowatt hours distributed during the week amounted to 8,446,193,000. This compares with an output of 7,317,817,000 for a like period in 1952, or a 15.4 percent gain, according to the Edison Electric Institute. Of particular interest is the fact that this record was set during the usually torrid summer months when production shows seasonal declines.

Stretch-out Hurts Special Steels

Orders for high temperature steels show a drop of 35 percent in the last two months as a result of cutbacks in Air Force orders. Orders for stainless steel plate, for atomic energy installations also have declined. While general demand for the high temperature alloys and stainless steel remains high, things are quieter.

Railroads Lose Ground

At the railroad convention last week several interesting statements were made by William T. Faricy, president of the Association of American Railroads. While modern railroads have become more efficient due to diesels, modern freight and passenger cars and other pieces of new equipment, the railroads are still losing ground competitively. Wages have increased 88 percent, and since 1921 supplies and equipment has increased 100 percent; yet revenue increased only 12 percent. Return on investment is 4 percent. Thirty years ago the railroads were handling 80 percent of all intercity freight in the U. S. By 1950 they were handling only 60 percent and the curve is still downward.



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Tested steel—racked separately by heats—is taken from stock; prepared to your specification; given a final inspection and shipped to you quickly. And with your steel (as-rolled or annealed), you receive complete test data to verify quality and guide your heat treatment.

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Good Fixtures Expedite Arc Welding of Heavy Assemblies

By **William T. Potter,** Supt., Mattoon Plant, Gar Wood Industries, Inc.

Some employ hydraulic clamping to produce just enough camber to counteract distortion and save straightening. Time saved in set up is also a factor in offsetting first costs.

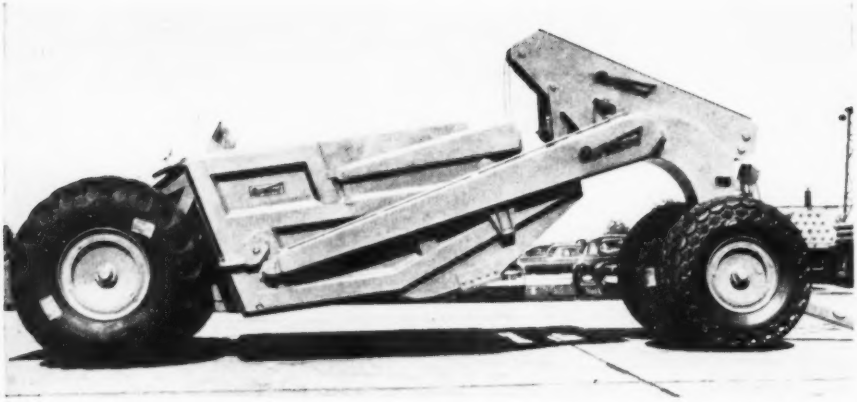
WELL DESIGNED welding fixtures have proved their worth on several scores at the Mattoon, Illinois, plant of Gar Wood Industries, Inc. These fixtures are employed to good purpose to expedite the fabrication of heavy components of earth moving equipment bearing the Gar Wood name, such as that appearing in figure 1.

Some of the fixtures are quite simple and are relatively inexpensive. Others involve higher costs but all have contributed so much to over-all economy in manufacture that costs are soon amortized by the savings they effect. In all cases, setup time is much reduced, and in some cases it is halved.

In most instances welding time is also decreased, often because Lincoln manual hidden arc welders that are faster than regular hand welding can be used. There are also savings in avoiding or counteracting warpage, especially where this warpage would otherwise be sufficient to require straightening operations. Finally there are savings in subsequent assembly of weldments, partly because even minor warpage or other dimensional variations may delay final assembly especially when components do not fit as desired.

Among excellent examples of good fixture construction are the low benches shown in figure 2. These are employed for the assembly of right and left side members of earth movers. These large and relatively flat components each require about 174 feet of fillet welds, chiefly those needed in joining welds, nel section reinforcements to side plates.

All save a small footage of such welds are produced with semi-automatic hidden arc welders that not only do faster and better welding but also tend to minimize warpage. Nevertheless, some warpage does occur because nearly all welds are against the outer face of the plate and there are none on the inner



1. Gar Wood earth mover typical of those fabricated largely by arc welding in the Mattoon plant of Gar Wood Industries, Inc.

face. Unless this warpage is avoided by some expedient, it must be corrected by straightening at considerable added expense for, otherwise, mating parts will not fit.

An excellent expedient was applied in this case by using fixtures whose top plate or bed has about a ½ inch camber both transversely and longitudinally. This bed plate is 1½ inches thick and is heavily reinforced on its under face. The amount of dish or camber on the top face was determined by measuring warpage that occurred in earth mover side members if they were clamped to flat faces while welded. Actually, the camber is just sufficient to counteract the warpage so that when the assembly is released from the fixture after welding, its inner face becomes flat as desired.

Another and important feature of these fixtures is the use of a bridge supported on side carriages that run on wheels along two edges of the plate. Each bridge has a foot that hooks under the edge of the plate but moves easily because the foot does not contact this edge until a jack is used under the bridge to clamp a reinforcement to the plate of the side frame to be welded.

Setup starts with laying a plate precut to correct contour on the dished bed. When so located the edges of the plate are clamped by wedges that are driven under C-clamps permanently bolted to the bed at intervals around the plate contour. These wedges hold the plate during subsequent application, clamping and tacking of reinforcements to the plate.

Reinforcements are previously formed to channel section and when correctly located must be clamped so that their lower edges are forced against the plate. This force applied by the jack slightly springs both the reinforcement and the plate, dishing the latter until it is pressed firmly against the dished bed. When so clamped the reinforcement is tack welded to the plate. By repeating this clamping and tacking at intervals along each reinforcement the assembly is built up with the desired camber.

Then the bridge is rolled to the end of the fixture where it is out of the way while a squirt welder is used to complete the tacked seams. Only a few

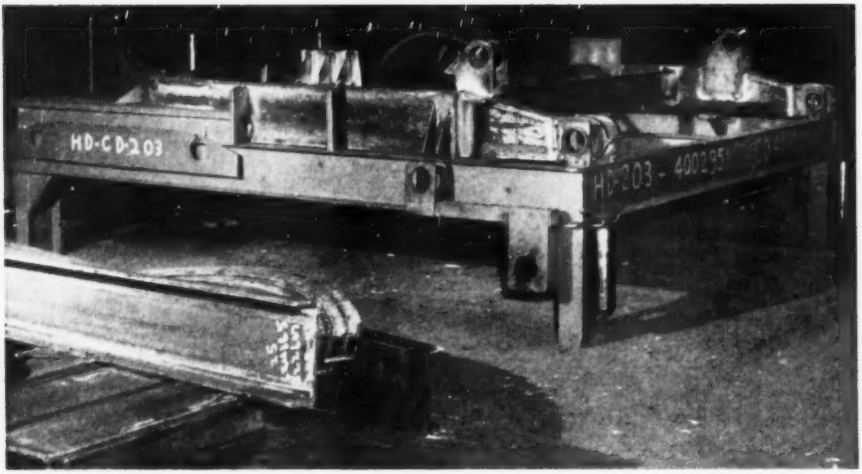
2. Pair of cambered fixtures used for holding and welding pairs of side frames for Gar Wood earth movers. Cambering compensates for warpage in welding and saves the cost of separate straightening operations.

short joints that slope too steeply for the granular flux to cover the arc are hand welded. While welding is in progress the setup man moves to the second fixture and makes another setup there. In this way two men work alternately on the two fixtures. Thus, each becomes expert in his part of the job and does it rapidly and neither interferes with the other. With the fixtures it takes about 16 man hours to complete a pair of side frames that required about 40 man hours before or a labor reduction of 60 per cent, weld quality being improved.

Somewhat similar savings are effected in a very different type of fixture, figure 3, for an arch shaped weldment or yoke shown in figure 4. Two 12x½ inch channels previously roll bent to semi-circular shape through the central portion of their length are the major components of this assembly. After roll forming the channels are placed so that their legs face each other, meet along straight portions and are joined by separate web plates around the arch. Thus, the assembly has a box section throughout its length.

Besides these double channels, there is welded between them near the open end a straight spreader channel and some eye and other brackets. Eye portions are located by removable pins that pass through bracket eyes as well as through positioning holes in the fixture. Most of the pins and holes can be seen in figures 3 and 4. A major requirement of the fixture, of course, is that it holds the components in correct location until they can be tack welded, thus insuring that the weldment will fit mating components in the final assembly of the earth mover.

As the roll bending of center portions of the two main channels to true semicircles is not always attained, it was sometimes difficult to fit them into correct relative position. With the fixture, however, such work is greatly facilitated by providing a horizontal hydraulic ram that swivels about a vertical pin fixed at the center of the inner arch semi-circle. The pin is supported by



3. Side view of a large fixture employed for locating and tack welding the components of a heavy arched yoke shown in place in the fixture, which greatly expedites assembly operations.

cross beams that intersect at the pin and are extended to side channels forming the four sides of the fixture frame.

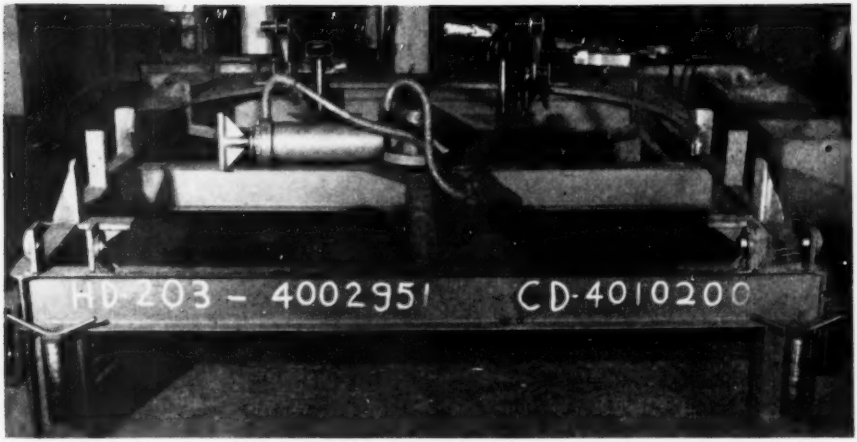
Above this frame at one end is a 1½ inch plate whose inner edge is cut to a true semi-circle that fits the outer radius of the outer channel of the yoke. All fixed components of the fixture proper are securely welded together. A hydraulic pump is provided to operate the swiveling hydraulic ram whose cylinder is connected to the pump by flexible tubes.

In loading the fixture, the two bent channels are put in place along with web plates that fit inside the channel legs. These web plates are spaced apart vertically by welding to two tubes that fit over vertical pins located one at each side and about 3 feet from the center of the arch. By swinging the hydraulic ram and using it at successive points around the arch, it is possible to force the outer channel to set properly in the fixture and also to bring the inner channel into correct position throughout the semi-circle.

Actually, the ram acts also as a clamp and when the parts are brought by it into correct relation they are tack welded to hold this relation. When this has been done, it is a simple matter to set the straight spreader channel in place and tack it as well as to do likewise with eye fittings and brackets.

Tacking in this manner not only insures correct relation of all components of the assembly but makes the assembly into a comparatively rigid structure that can be removed to horses while welding is completed and that will not alter significantly in essential dimensions during this process. Consequently, the major part of the welding can proceed outside of the fixture while a new set of components is being set up and tacked in the fixture.

After a tacked assembly is removed from the fixture, all horizontal seams are completed with a manual hidden arc unit which is much faster than



4. Yoke assembly fixture as it appears when not loaded. At the far end is the arched plate against which the outer arc of one major channel fits. At the center is the horizontal swiveled ram that is used for clamping.

regular hand welding and yields better penetration as well as stronger welds. Some seams are completed in a single pass but where a heavier fillet is required, a second pass is necessary. By using this fixture and employing the squirt welder for most of the joints, total labor on this job has been reduced by about 50 per cent.

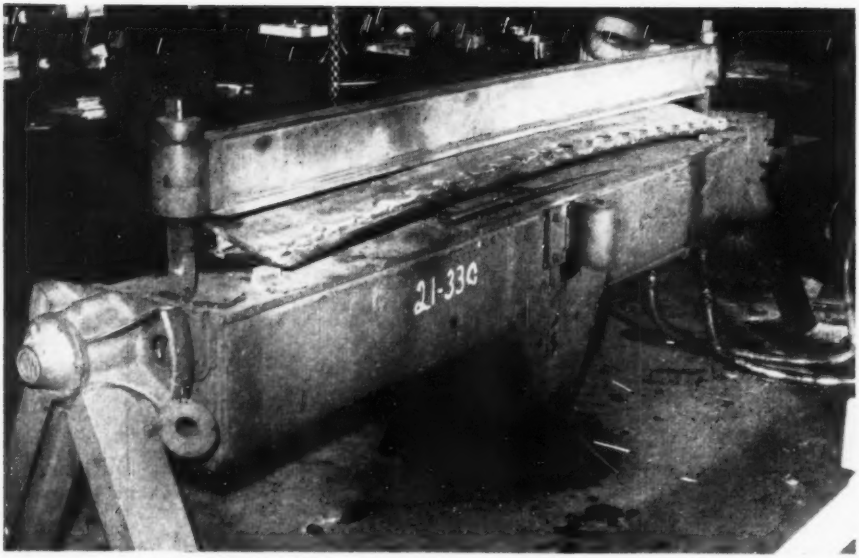
Still another type of fixture employed to advantage is illustrated in figure 5, and is used to form or bow the components as well as to hold them securely until enough tacking has been done to retain the bow required in the finished assembly. When completed, this assembly becomes the cutting lip for a scraper.

Basically, this fixture comprises a box section beam or base made by welding heavy plate together and an upper I-beam joined to the base by a pair of threaded tiebars. Below the base and supported by a crossbar fastened to a pair of brackets is a hydraulic jack whose function is to bow the assembly and then to hold it while tack welding is done.

Components of the assembly are a flat bottom plate, a narrow vertical plate or strip standing on edge and a top plate that has been formed by making a longitudinal bend next to a serrated toe portion. This portion rests on the lower plate while the remainder of the upper plate slopes upward and rests against the top edge of the narrow vertical plate. When in correct relative position, the two ends of the three components are tack welded.

Suitable tapered blocks are then placed between the ends of the tacked assembly and the upper beam, after which the jack at the center is elevated to bow the assembly a specified amount. When this has been done, welds are made along the serrations and also where the edges of the narrow strip bear against upper and lower plates so that the assembly will hold the desired bowed or cambered shape.

To facilitate the assembly done largely with manual hidden arc welding the fixture is mounted on trunnions so that it can be rocked into most convenient welding positions. It will thus be seen



5. Trunnioned fixture in which scraper lips are assembled, bowed to required shape and then are arc welded so as to retain the bowed shape.

that the fixture not only supports the work and facilitates the welding but also saves a separate bowing operation that otherwise would have to be done in a press or by some other means.

Many other fixtures are used in this plant for weldment fabrication. They include several mounted on trunnions partly because such mounting makes it easy to bring many joints to or near horizontal position where weld can be covered by flux so that the economies of hidden arc welding can be realized. Also included are other fixtures that bow or camber the work to compensate for welding warpage and thus save straightening operations. Thus, in most cases, the fixtures serve a dual purpose as they go beyond the usual function of merely locating components correctly.

The End.

"And this hand scratches the union steward's back."

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- Accuracy
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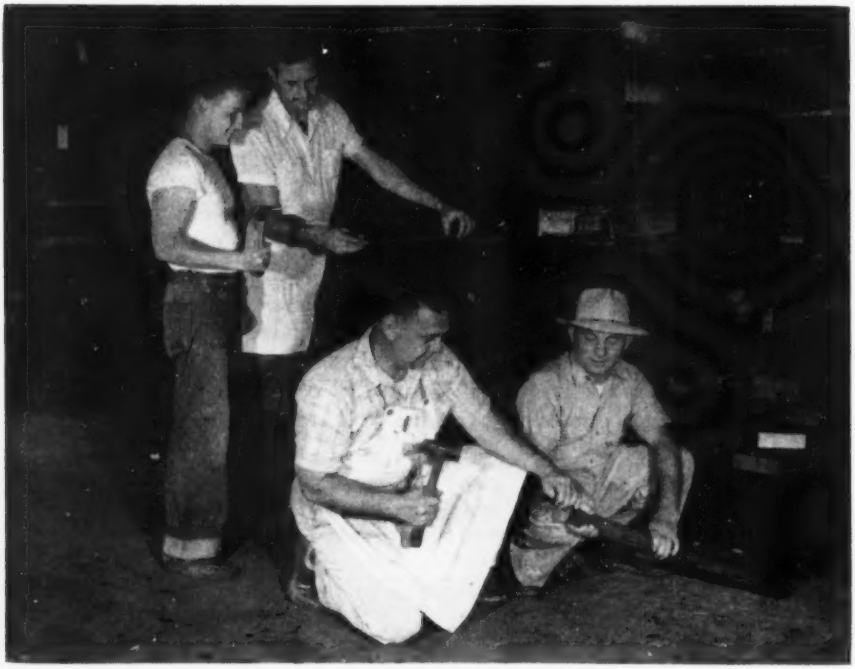
Tooling Material Standardization

By **Fred M. Burt**, Consulting Engineer

THE ELIMINATION of from 35% to 40% of the different types (brands and specifications) of tooling material carried in inventory, accompanied with a considerable increase in the variety of sizes and shapes, has been the result of the new Tooling Standardization and Control Plan at Northrop Aircraft, Inc., Hawthorne, Calif.

Heretofore, as is common in many tooling departments, when a tool designer was assigned to the devising of a new tool or die, he might specify a steel, not in stock, which he had previously used in some other tooling department, for a presumably similar operation, and which had proven to be relatively satisfactory. Later, another tool designer with a like problem would

Metal stamps are used to apply tool codes to both ends of bar stock.



specify a steel with differing minimum Rockwell and other properties, following the same method of determination.

Subsequently, with both choices of tool steels proving to be "off the beam," through, perhaps, the die falling short of productive usage, up comes a very potent argument for basing such choices on more than one or two personal opinions, no matter if the tool designer(s) are top men.

A large amount of past experience and records, supplemented by the expert knowledge of tooling and heat treating process engineers, therefore entered into the makeup of a standardization and process manual, recently published by the firm, guiding every phase of the operations. In the beginning, for a concrete starting point, a tentative list of steels was chosen, identified by "class" and "properties." After a year of work in verification, revising, analyzing, accumulating and boiling down a large amount of factual data, the steels were finally chosen to meet virtually all Northrup tooling material requirements.

The process manual is in four sections:

1. Tooling specifications; 2. Procurement information; 3. Inspecting, testing and accepting procedure; 4. General instructions.

(Editor's note: Because of typographical difficulty in indicating steel stock as rounds, flats, rectangular, etc., the following apply: round, single asterisk; square, double asterisk: diamond, single dagger; triangle, double dagger.)

SYMBOL CLASS	PROPERTIES
1* Oil hardening, non-deforming steel ..... (Interchangeable with 4*)	Medium wear and tough Deformation: +0.0004" per inch Min. Rockwell: C60 Compression strength: 373,000 p.s.i. Unnotched izod impact: 30 ft. lbs. Torsional impact: 145 ft. lbs.
2* Oil hardening, non-deforming steel	High wear Deformation: +0.00035" per inch Min. Rockwell: C61 Compression strength: 375,000 p.s.i. Unnotched izod impact: 20 ft. lbs. Torsion impact: 110 ft. lbs.
May be nitrided	Surface min. Rockwell: 15N91 Core min. Rockwell: C51 Compression strength: 325,000 p.s.i.
3* Oil hardening, shock resisting steel	Tough shock resisting Deformation: +0.0012" per inch Min. Rockwell: C55 Tensile: 308,000 p.s.i. Yield: 268,000 p.s.i. Compression strength: 360,000 p.s.i. Notched izod impact: 11 ft. lbs.

SYMBOL CLASS		PROPERTIES
	May be nitrided	Surface min. Rockwell: 15N91 Core min. Rockwell: C46 Tensile: 230,000 p.s.i. Yield: 215,000 p.s.i. Compression strength: 300,000 p.s.i. Notched izod impact: 15.8 ft. lbs.
4*	Oil hardening, non-deforming steel Interchangeable with 1*	Medium wear and tough Deformation: +0.00045" per inch Min. Rockwell: C60 Compression strength: 382,000 p.s.i. Unnotched izod impact: 10 ft. lbs. Torsional impact: 140 ft. lbs.
5*	Oil hardening commercial drill rod and flat ground stock Same composition as 4*	Medium wear and tough Deformation: + 0.00045" per inch Min. Rockwell: C60 Compression strength: 382,000 p.s.i. Unnotched izod impact: 10 ft. lbs. Torsional impact: 140 ft. lbs.
X*	Oil hardening, non-seizing graphite	Medium wear and tough non-seizing Min. Rockwell: C61 Deformation: +0.0015" per inch
1**	Water hardening shock resisting steels	Min. Rockwell: C58 Deformation: 0.010" per inch Notched izod impact: 18.7 ft. lbs. Tensile: 335,000 p.s.i. May be flame case hardened.
2**	Water hardening carbon plow steel	Low cost tough steel Min. Rockwell: C58 May be flame case hardened.
3**	Water hardening, medium carbon steel	Medium wear and tough Water hardening Min. Rockwell: C58
4**	Water hardening commercial drill rod and flat ground stock	Min. Rockwell: C60 Case, 1" dia. specimen: min. 0.125", max. 0.187"
CR**	Case hardening cold rolled steel	Case hardened from 0.10" to 0.095" deep

SYMBOL CLASS	PROPERTIES
HR** Case hardening hot rolled steel	Same as CR**
1† Air hardening, non-deforming steel	Tough air hardening Min. Rockwell: C58 Deformation: +0.0003" per inch Torsional impact: 110 ft. lbs.
2† Air hardening, non-deforming steel	Wear resistant steel Min. Rockwell: C63 Deformation: +0.0003" per inch Torsional impact: 110 ft. lbs.
1: High speed steel	Wear resistant steel Min. Rockwell: C63 Deformation: +0.0015" per inch Unnotched izod impact: 24.8 ft. lbs.
For any special steels which do not fit under any of the classes designated by symbols listed, contact process engineering for symbol.	Special property requirements.

Note: The tool machinist or his designated assistant shall see that the symbol is stamped or electric penciled on the tool steels routed for heat treatment, except where parts are too small for such identification, then they shall tag each part or place in a tagged container.

From 90% to 95% of the tool steels used by Northrup will probably continue to fall in four classes—Codes 1*, 3*, 5*, and 2**. Stocks include rounds, squares, rectangles and flats in standard lengths. Regardless of whether steel in any class comes from one or more vendors, it is identified, for stocking and use, solely by stamping the code number in both ends of each piece; with, of course, stock segregation of material in each specification. When any piece is cut to fill a tooling requisition, the code number is stamped in each cut end.

Under procurement information and under each code no. are listed several suggested brand named steels (with supplier names) which may be considered as sources of supply (except common steels, Codes 2**, 3**, 4**, HR**, and CR** from "any vendor"). The sources are to be limited to as few as possible in order that the quantity of purchases will compensate the steel concerns for metallurgical services in helping solve the Northrup tool and die problems. Other brands (besides those listed) may also meet the requirements, and may be added after consultation with the process heat treating engineer. The HR** and CR** code numbers are not stamped on these steels, but are used only as short cut references in the drafting room.

Under each of these codes there is a complete tooling material specification covering type, manufacture, condition, properties, shipping instructions and rejection comment.

The general instructions are made up

of process heat treating manual bulletins covering each of the coded tool steels, as to specific heat treating and machining processes. Paragraph titles include—Identification, Properties, Annealing, Hardening, Tempering, Atmosphere, Martempering, Nitriding, and Forging. These controls along with standardization on properly selected tool steels is calculated to save at least 20% in tool and die manufacturing losses. Where a design or specification prevents the machine shop from taking the precautions outlined in the related bulletin, they contact the process heat treating engineer. He is also notified when a tool or die breaks, or is too soft for regular production requirements, and, when necessary, will request a material or design change, or will specify special machining or heat treating instructions.

(This is an example of a bulletin on oil hardening such as is used at the West Coast plant; this one happens to be on 3*.)

Prepared by .....
Proc. engr. .....
Bulletin title .....
Bulletin no. .....
Model .....
Date .....

IDENTIFICATION

The 3* code shall be stamped or tagged on all steel to be heat treated by this process.

PROPERTIES

Tough shock resisting steel
Hardness—
Deformation .....
May be salt bath nitrided

Min. Rockwell C 55
+ 0.0012 inch per inch
Min. Rockwell 15N 91

ANNEALING

Preheat to 1200°F. and soak ½ hour per inch of thickness.

Transfer or heat to 1500±25°F. and soak not less than 1½ hours for steel or pack up to one inch in thickness and increase ½ hour for each additional inch in thickness.

Cool in furnace, at a rate not exceeding 200°F. per hour, until temperature is below 800°F., then air cool to room temperature.

Max. Rockwell B
98

NORMALIZING

Preheat to 1200°F. and soak ½ hour per inch of thickness.

Transfer or heat to 1600±25°F. and soak not less than 1½ hours for steel or pack up to one inch in thickness and increase ½ hour for each additional inch in thickness.

Cool in still air on air cooling racks. Temper when necessary to obtain hardness range.

Max. Rockwell C
25

HARDENING

When the steel has been formed or forged, anneal before hardening.

Preheat to 1200°F. and soak ½ hour per inch of thickness.

Transfer or heat to 1770±25°F., soak until steel is uniformly at temperature and hold at temperature for ½ hour per inch of thickness but never less than 15 minutes for thin sections. Quench within 10 seconds into oil at a temperature below 140°F. Agitate until the steel can be held by bare hands and immediately temper. Martempering may be used when necessary to prevent cracking.

TEMPERING

Steel is heated to 400° F. and soaked 2 hours for thickness up to one inch plus ½ hour for each additional inch. Oil quench to room temperature.

Min. Rockwell C
55

ATMOSPHERE

Anneal in an atmosphere furnace, neutral pack or use a protective coating.

Harden and normalize in a salt bath, atmosphere furnace, neutral adjusted "air gas" atmosphere or use a protective coating.

MARTEMPERING

Quench from hardening temperature into a 350±25°F. salt bath and hold in bath until part cools to bath temperature.

Air cool to room temperature, temper.

NITRIDING

Nitriding is used on steel which has

THE HAMILTON

PORTELVATOR®

(Portable Elevating Table)

MAKES IT *Easy* TO LIFT • LOWER LEVEL • TRANSPORT LOADS UP TO 5,000 lbs.

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Can be worked at from **ALL 4 SIDES**

Slow or fast lift.

Self locking at any height.

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(table can't tip)

Lift mechanism can be operated from either end.

Turns easily on anti-friction casters. Positive floor lock.

WELDED CONSTRUCTION

Mechanical lift through worm, worm gear and screw.

TABLE CAN'T SETTLE

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STYLE "A" (Illustrated)*

Max. Height 40"	Min. Height 25"	Length 33" Width 21"	Weight 225 lbs.

Capacity 2,000 lbs. (plus safety factor)

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SAF-T-RAIL — Guard rail fits either top or middle table.

ROLLER CONVEYOR TOP • RUBBER TIRED WHEELS

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THE *Hamilton* TOOL COMPANY
826 SO. NINTH STREET • HAMILTON • OHIO • U • S • A

been hardened and tempered.
Nitride in bath at 950±10°F.
Air cool to 250°F. and clean in hot water.

Min. Rockwell 15N
Surface **91**
Min. Rockwell C
Core **46**

Soaking time in Nitriding bath:
By Size:
½ inch o.d. and less ..... 25 min.
to 1 inch o.d. ..... 45 min.
By weight:
to ½ lb. ..... 35 min.
to 2 lbs. ..... 60 min.
Over 2 lbs., add 20 minutes per pound. Steel to be Nitrided must be of a size which will enter a 10 inch diameter by 12 inch deep salt pot.

FORGING
Preheat to 1200° F. and soak ½ hour per inch of thickness; transfer or heat to 2000°F. and soak until entire mass of material reaches this temperature; forge material between 1800 to 2000°F. Do not forge below 1650°F.; cool slowly in ashes, lime or in furnace; anneal after forging to relieve strains.

Type: ..... **Oil hardening tough shock resisting steel, 3°**

Analysis: .....

C	Mn	Si	Cr	W	S	P	V
.50 - .60	.15 - .35	.20 - .90	1.15 - 1.5	2.0 - 2.8	.025 Max.		.15 - .30

Manufacture: ..... Steel shall be made by the Crucible or Cold Melt Electric Furnace Process, using high quality materials and sufficient reduction process to develop a refined and uniform structure free from injurious segregations, inclusions, porosity, pipe, etc., which will in any way cause tool failure under normal operating conditions. Surface defects such as decarburization, seams, cracks, pits, scale, etc., shall not exceed the following depths:

Thickness in.	Max. depth in.	Thickness in.	Max. Depth in.
Up to 1.25	.0312	3.1 to 5.0	.1250
1.26 to 3.0	.0625	Over 5	.1875

Condition: ..... Steel shall be supplied in the annealed condition and hardness shall not exceed Brinell 215 (Rockwell B98). Shapes and sizes shall be supplied to purchase order requirements subject to dimensional tolerances published by the steel producer.

Properties: ..... A steel specimen one inch or less in thickness by 3 in. long shall meet the following requirements:

Oil Quenched From °F	Tempered °F	Surface min. Rockwell C	Max. Deformation in. per in.	Max. grain Size Shephard
1750 ± 25	400 ± 10	55	+ .0012	7

Shipping: ..... Steel shall be bound in bundles or containers and identified by attaching 2 packing slips (inside waterproof container). Packing slips shall list purchase order no., heat no., quantity, size, brand name and certify that the steel will meet the requirements of this specification.

Rejection: ..... Steel not conforming to the above requirements will be subject to rejection.

The End

POP'S school of Filing

POP'S READIN' HIS MECHANICS' "BIBLE" AGAIN
YEH, GETTIN' READY F'R 'NUTHER SEMINAR ON THUH RIGHT FILE F'R THUH JOB
IF IT WASN'T F'R POP SOME OF US'D BE SNAGGIN' CASTIN' FINS WITH A FINISHIN FILE!
I USE T' THINK A CURVED CUT WUZ A KINDA SMOKIN' TERBACKER!
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Nicholson Superior Milled Curved Tooth File (rigid type)

Changing personnel in industry creates a never-ending educational need on the subject of files and filing. In the shop-school the logical teacher is usually the shop foreman or production superintendent. The logical text-book is Nicholson's "FILE FILOSOPHY." From it we quote:

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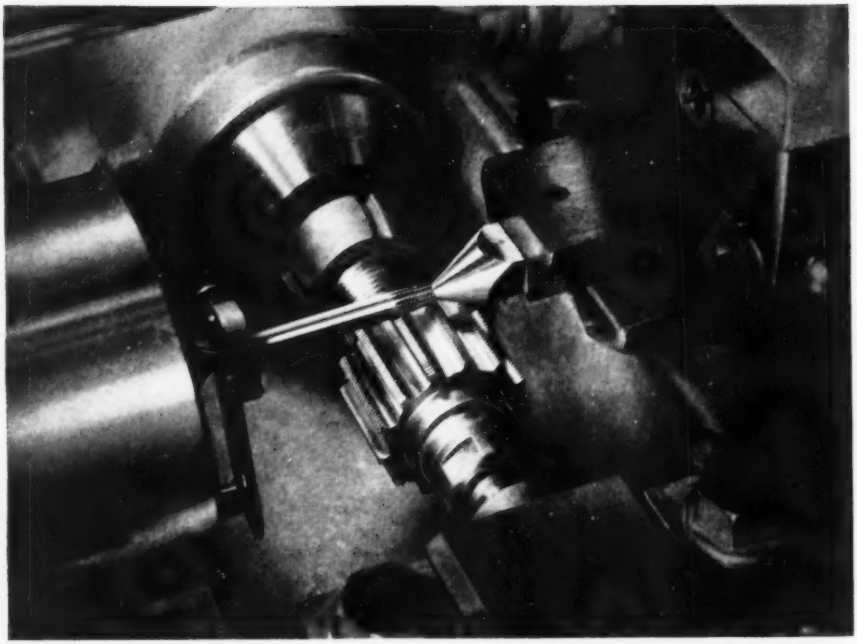


Consistently Better Gears

WITH CLASS AA HOBS

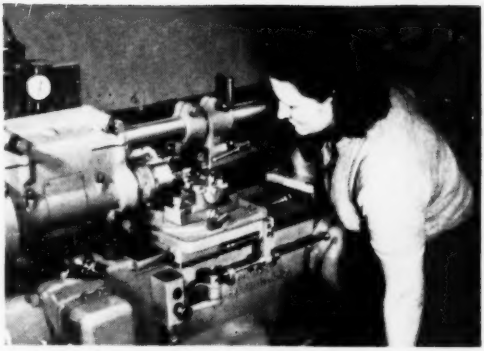
Specialists in the field of instrument gears, G-M Laboratories, Chicago, Illinois employ the latest precision techniques to assure consistent accuracy in their work. Their modern gear department is completely temperature and humidity controlled, and Precision Type Barber-Colman Hobbing Machines are used.

To produce the finest gear accuracy, this firm has standardized on the use of Class AA hobs with taper bores for their precision work. Experience has shown that Barber-Colman Precision No. 6-10 Hobbing Machines, in combination with Class AA hobs, give them the most accurate tooth form and spacing. All gears are finish hobbed, without further finishing operations. Tolerances on the pinions shown here consistently check within .0003" tooth-to-tooth composite error, and .0006" total composite error.

BUILDERS OF PRECISION GEAR

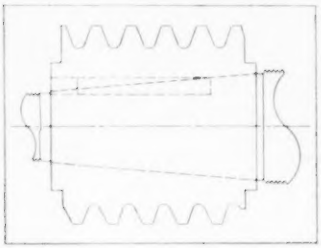
GREATER NUMBER OF CLOSE TOLERANCE GEARS USING CLASS AA HOBS

Although the hob is not the only factor affecting the accuracy of gears, it does have an important effect, particularly upon the profile of the gear tooth. Class AA hobs are made to consistently closer tolerances than any other hobs, and have proved themselves in actual production for many years. Performance records show that, per sharpening, Class AA hobs produce more gears with close tolerances than any other hobs.



Class AA hobs are recommended for the utmost in precision, where other conditions warrant the use of a tool of this class. This accuracy in the tool, however, may be lost if the hob is not properly mounted or trued on the machine. Because of this, Class AA hobs are recommended with taper bores. The taper makes it much easier to true hobs on the arbor where high accuracy requirements are demanded. Compared with the sliding contact on straight hole hobs, the taper provides metal-to-metal contact, eliminating the possibility of an increase in runout during the cutting operation. Time is also saved for the operator because the hob will run as true as the spindle.

TAPER BORES RECOMMENDED . . .



Production-line accuracy in all metal cutting operations is constantly approaching closer limits. Gear hobbing is perhaps the outstanding example. When you have gear tooth problems be sure to ask Barber-Colman Hobbing Engineers to work with you. Their long experience in gear cutting is available to you without cost or obligation.

Write for a copy of Hobbing Notes — "*Hobbing Accurate Gears*"

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HOBBING MACHINES
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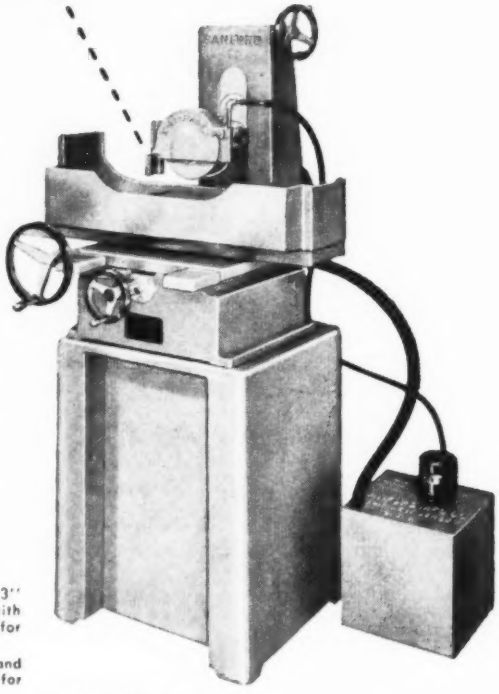
HOBS AND MACHINES SINCE 1911

SANFORD
SURFACE GRINDER
MODEL MG

For Dry or Wet* Grinding!

PRECISION • SPEED • SENSITIVITY



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This sensitive machine grinds to micro-inch accuracy with no vibration, with maximum dimensional stability. Here's why:

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- **Dials are large and legible.**

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*With optional equipment

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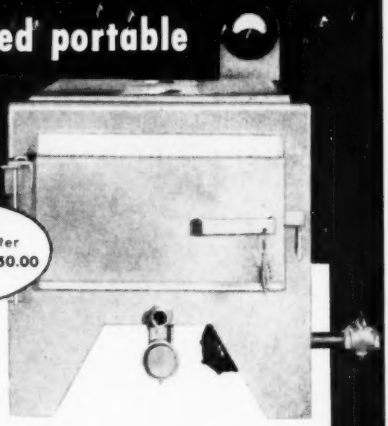

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1230-7 AHT	12" x 7½"	12" x 30"	26 x 44 x 27	140,000	825#	$450.00

Extra for pyrometer, $49.00

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Usually only in larger, more costly machines do you find the combination of speeds, swing, power, feeds and threads that are standard equipment on Rockford Economy Lathes. These features make it possible to machine a wider range of work with fewer non-productive hours than is possible with many machines in its class.

Medium-sized and economy-priced, it's built to handle any job that can be turned or threaded within 16-1/2" or 18-1/2" swing, and 30" to 102" center distance. 3100 lbs. of weight, 6' bed and zero precision bearings furnish the rigidity and precision for turning out tool room accuracy.

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ROCKFORD ECONOMY LATHES—16" and 18"

ROCKFORD MACHINE TOOL CO.

2500 Kishwaukee Street, Rockford, Illinois

Big Economies on Small Runs Using New-Model Automatic Screw Machine

By **George Medlin,** Foreman (Automatics)
Parker Aircraft Co.
Los Angeles, Calif.

BIG ECONOMIES on small runs—that's the shop experience of Los Angeles' Parker Aircraft Co.'s valve division.

In the valve division we can show production gains up to 300% when work, formerly assigned to manually-operated turret lathes, was set up on the shop's six new Brown & Sharpe No. 4 automatic screw machines.

Basically, two factors determine shift of work from turret lathes to automatics at Parker: (1) the run size; (2) the ability of a few machinists to stock and oversee a number of automatics. This, compared to the required one-man-per-machine when using turret lathes.

By deploying a few machinists over a number of automatics, we figured that it was possible to realize upwards to 135% efficiency while running notoriously inefficient short orders.

Typically, two setup men and one helper attend to all setups and first operations on the six automatics. Women machinists (they do a "bang-up job") handle second-operations.

When one machinist can oversee up to three automatics, which run with only minimum supervision, it's obvious that (ideally, at least) a high percentage of efficiency can be attained.

This is especially true of short runs, which by their very nature mean more hours of setup time over the shop week. Yet this admittedly objectionable feature, inherent in short runs, can be greatly reduced because two machines, for instance, can be running first operations while a third is set up.

As an example: we recently machined 200 pieces of 1½ dia. Armco iron mounting flanges on our automatic screw machines. Altho' the piece was drilled through with a ¾" hole, held to plus-minus .001" and externally threaded with a class 3 thread, 1⅛-20 pitch, 24 pieces were turned out per hour. The same operation on a turret lathe produced only about 12 pieces an hour, with output varying considerably due to fatigue and down-time. Down-time was incurred because the slower output meant longer hours on the machine, thus more tool sharpening.

Admittedly, however, setup time on

the automatics is longer (about 1½ times) than for turret lathe operation. But faster delivery speed, once the setup is completed, means long-run economies even on small orders.

About five hours were required to set up the flange job on the Brown & Sharpe No. 4's. This was approximately two hours more than for the turret lathe setup. Yet the automatics finished the 200-piece run in about 8½ hours. Total time to set up and run job: 13½ hours.

The turret lathe's initial advantage on this short run was soon outdistanced. Although only three hours were required for the setup, the lathe's running time involved almost 17 hours. This, plus 3 hours of setup and running at the rate of but 12 pieces hourly, ran up a 20-hour total for the same operation.

The single-spindle automatics saved 6½ hours on this one typical job.

However, it must by no means be assumed that I am down on turret lathes; that would be foolish. Turret lathes are used constantly in our company. They're doing a splendid job, and this article must not be construed to mean that I want to take every job off the turret lathe and put it on an automatic. We are here primarily concerned with our experiences on certain jobs that we honestly feel belong on automatics. On the other hand, there are unquestionably many manufacturers who run jobs on automatics that belong on turret lathes. But to return to our example:

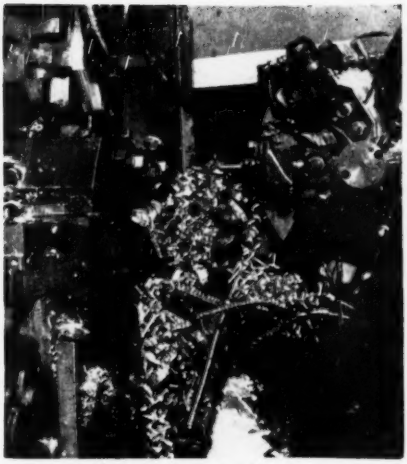
Following is the sequence for the flange mounting run, an operation which increased short-run production efficiency by about 70%:

Sequence of operations	Throw	Feed	Rpm	Hdt	Station on Turret
Stop					1
Index turret					
Drill	1.125	.005	225	11	2
Turn					
Index turret					
Recess					
Rise					
Feed	.090	.002	45	3	3
Drop					
Index turret					
Bore in	.750	.005	150	7	4
Bore out	.750	.005	150	8	
Turn					
Index turret					
Seat	.110	.001	110	6	5
Form on	.260	.001	260	12	9
Form off	.260	.002	130	6	
Form	.093	.001	93	6	
Clear					
Thread 20-pi	.875	11-1	198	9.5	7
Dwell				1.5	
Clear					
Cut-off	.410	.002	210	13.0	8

1. Valve bodies, typical machining sequence is shown in the following photographs.

2. Feed stock: hex. 1-13/16" Dural.

The Brown and Sharpe 4G Automatics accept 2-inch dia. stock through the regular feeding mechanism. An outside feeding device increases their capacity to 2⅜" dia. For secondary operations, such as castings and other shapes, 2½" is held in the regular No. 26 collet, within the spindle. Variations with special collets and fixtures are too numerous to mention.

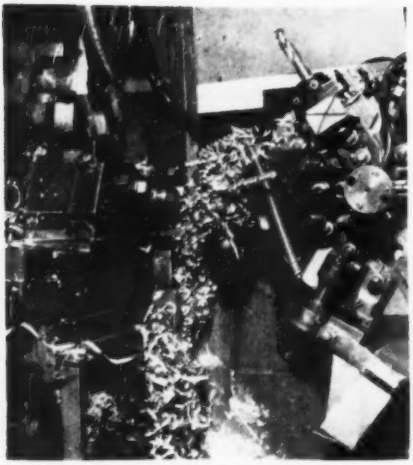


3. Drill 7/8" and turn 1-5/8".

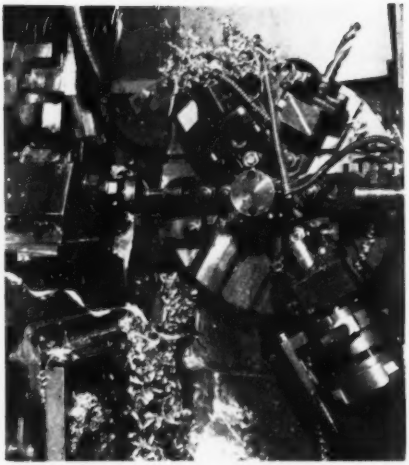
The machines have six prime stations. Each can hold up to 3 tools: a center tool and two side tools rigged in T-slots. Thus they can simultaneously work both internally and externally. In all, six primary tools and 10 auxiliaries can be mounted on their turrets, with individual oiling. Coolants are automatically shut off during turret indexing, turned on again when in working position—this to prevent splashing. Another feature: electrically controlled stopping and jogging. Time to produce a piece varies from 12 to 800 seconds, depending upon speed, feed and type of material. The operational sequence is controlled by an engineered cam.

When involved in first operations—that is, when stock is automatically fed to the chuck, machined and then cut off—the entire sequence is automatic. It's only during second operations, when individual machined pieces must be fed, that the automatic becomes a one-man-to-one-machine tool.

The cams control the feed of the front and rear cross slides, vertical slide and turret slide.



4. Drill 7/8" through, form O.D. front; form rear for cutoff.



5. Seat .187" deep x 1.500" O.D.

But getting back to short-run efficiency. As I see it, in my department, there are several factors against use of turret lathes for short runs. One is employee fatigue—caused by manual operation of turret lathes. Tied to this is the obvious truth that if a turret lathe requires nearly twice the running time as an automatic to turn out the same job, increasing adjustments are bound to crop up. This means down-time. A corollary: the longer the run, the more likely the necessity to shut down for tool sharpening. Thus, during the 8½-hour run required to turn out flange mountings on the automatics, no tool sharpening was required.

Our plant superintendent (valve division), Ed Helmreich, reports a production gain "over 500%" using automatics instead of turret lathes to produce a valve body. In this operation, the valve body was turned from 17ST dural hex stock, 1-13/16" dia. Spindle speed was 1965 rpm—top speed for the machine. Threading ratio was 11 to 1, or 185 rpm. And some of the runs for this machined part were small—in the neighborhood of 200-300.

Sequence of Operations:	Throw	Feed
Feed Stock		
Index turret		
Rough turn, 1.802 dia.	1.437	.010
Rough Drill, 1.547 dia	1.437	.010
Index turret		
Drill through .468 dia	1.375	.006
Skive 1.802 dia	.750	.003
Index turret		
Ream 1.547 dia	1.400	.008
Form rear slide	.375	.001
Ream and face 1.547 dia	.037	.001
Index turret	.750	
Tap 1⅝-14 in		11 to 1
Tap 1⅝-14 out	.750	1 to 1
Index turret		
Cutoff	.250	.002

We have computed that average set-up time for an average short run assigned its automatics is between 3½ and 4½ hours.

Usually, when runs exceed 200 pieces, they're assigned to automatics. However, we have on many occasions run 60-75 piece jobs on the screw machines, and with startling economies. There is no hard-and-fast rule as to "when," but in most cases the faster, almost unattended production of the automatic

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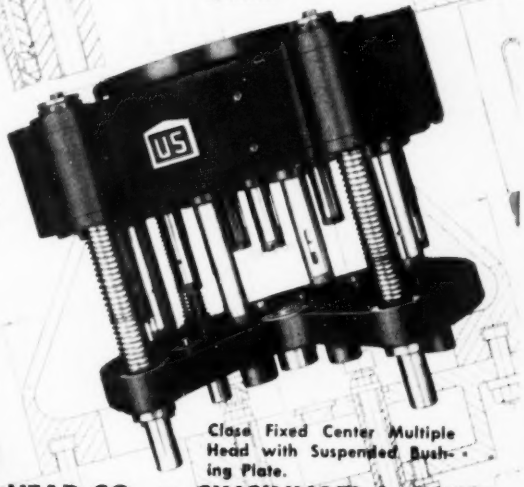

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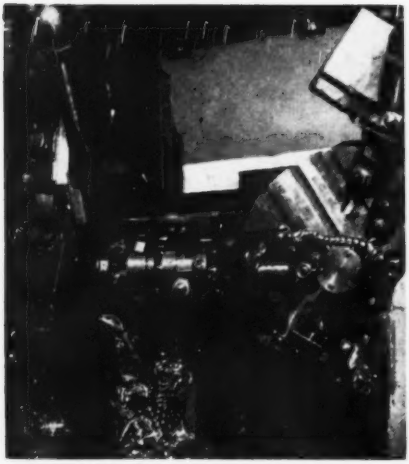

6. Thread 1-5/8", 14 pitch.

7. Cutoff and catch part.

screw machines shows savings even on short runs. Part of the responsibility for fast output once the setup has been made falls to the automatic's fast spindle speed and rapid indexing cycle—requiring but two seconds for indexing. Per piece cycles vary from 12 seconds to 13 minutes.

I am not yet convinced that the 200-piece job is the "break point" for putting automatics to use. Even the small 75-piece run can be done more efficiently on automatics, providing the additional setup time can be compensated by a much higher rate of production.

The End

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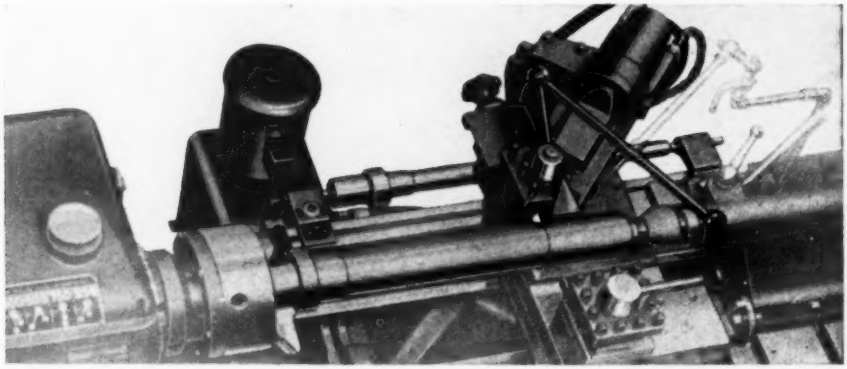

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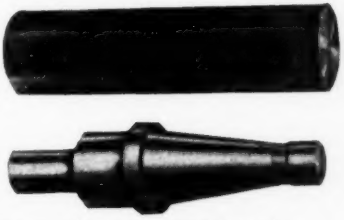

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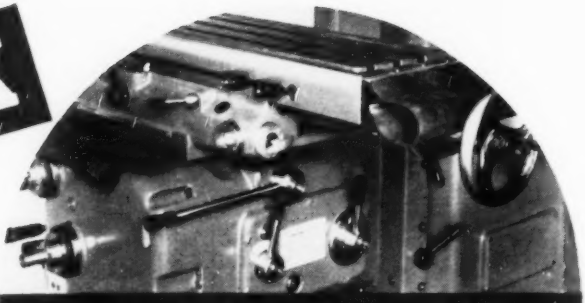

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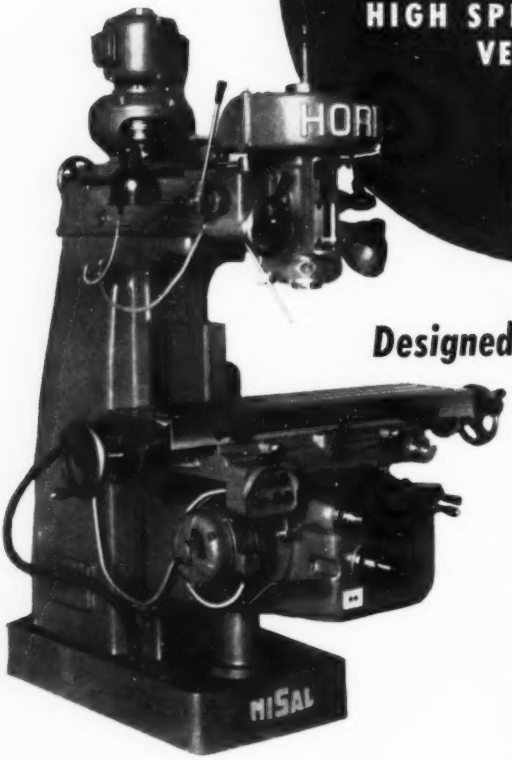

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Milling Setup for Worm Wheels

By **Tom Brown,** Consulting Tool Engineer

FOR A LONG TIME, a small subcontract machine shop had been cutting the teeth of bronze worm wheel rings in batches of about six at a time. The firm was not equipped with proper gear cutting machinery, but since they had a reputation for producing high quality work, the contractor continued to place short orders for the worm wheels with the firm, for various reasons which he found attractive.

On short batches, the procedure had been to gash roughly each tooth space in the worm wheel ring by plunging a single roughly shaped milling cutter into the periphery and then indexing to the next tooth. The roughed out ring was then mounted upon a freely rotating vertical spindle on the milling machine table, in mesh with a multi-tooth hob which was a copy of the worm, plus the necessary clearances needed. The revolving hob was arranged to mesh with the gashes in the freely rotating wheel blank and thus revolve it while the two were traversed slowly toward one another until the correct center distance between their axes had been reached and the hob had cut the wheel teeth to correct depth and form.

This crude method, which is well known in general engineering shops, worked very well on small lots but was slow in action and proved rather costly; the operation of rough gashing was particularly slow.

A revision of the method was necessary when the customer made a tenfold increase in the size of his orders for the wheels. Naturally, he expected a reduction in price for higher quantities and he also wanted his wheels at a more rapid rate than the firm had been supplying them hitherto. Some better and faster method of turning out the worm wheels was required, so the author was called in to evolve some scheme whereby this could be achieved.

By designing a special fixture for use on a standard milling machine of the horizontal type, the teeth in the worm wheel blanks could be cut in one operation without any necessity for preliminary gashing. This fixture is the subject discussed in this article.

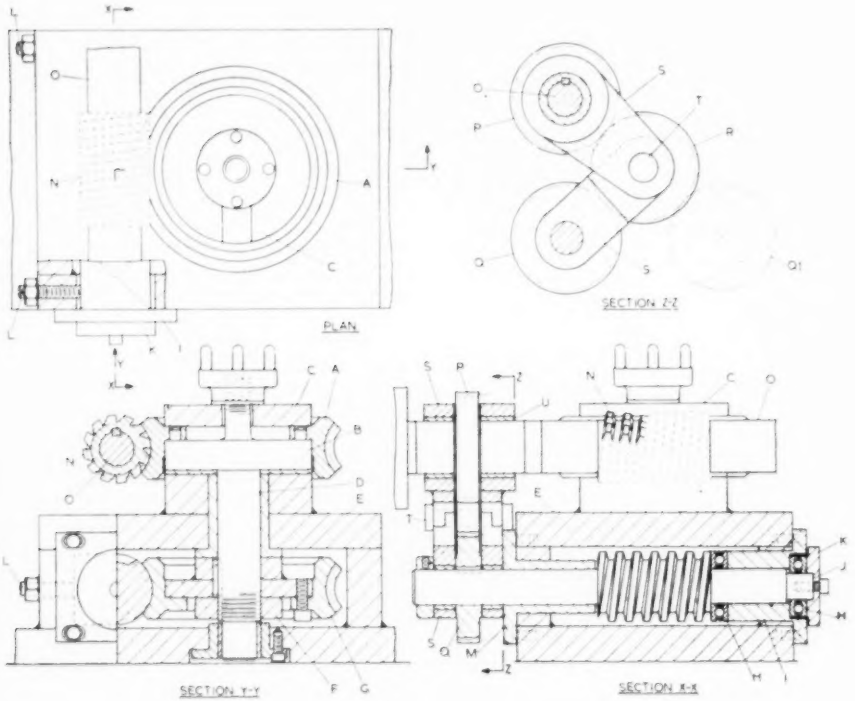
The worm wheel blanks are of the annular ring type and cast in bronze. The rings, when assembled, are mounted upon cast iron center pieces or hubs where they are secured in place by means of bolts engaging with lugs cast in the bores of the rings. A section across one of the rings is shown at **A** in the drawing (Section **Y-Y**). The ring is placed on the circular plate **B** with two vertical locating pins engaging with two of the holes in the cast lugs and

is held down firmly in place by means of the large **C**-washer **C** and the bar-tightened screw-down knob.

Integral with the plate **B** is the spindle **D** projecting downward into the body of the fixture and supported in a long bearing sleeve which is attached to the top plate **E** of the fixture bed. This plate is secured in place by means of dowels and bolts placed around its perimeter and can be removed, together with the spindle assembly so that the end clearance can be finely adjusted by means of the nut **F**.

Nut **F** also secures in place on the spindle the driving worm wheel **G** which is mounted upon a steel hub keyed to the spindle. The driving worm wheel is actually one of the finished worm wheels and was selected carefully from stock for accuracy of pitch and tooth form so that it would be suitable as a master wheel for generating the teeth on the components. This simplified making the fixture as it allowed a stock worm wheel to reproduce itself many times in the making of components. Below the worm wheel is a foot-step bearing **G** which further supports the main spindle and prevents it from deflecting under the driving pressure of the worm.

A section through the worm drive is at Section **X-X.** It will be seen that the worm has integral spindles projecting from either end. The whole unit is hardened and ground to ensure smooth running and concentricity. End thrust of the worm is catered for in both directions by means of the ball



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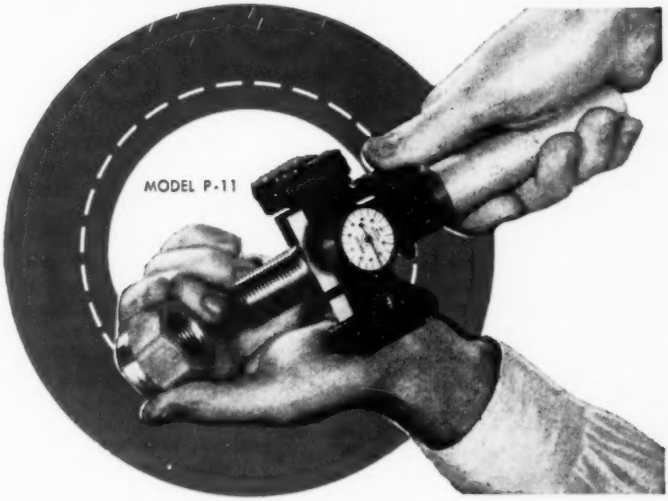

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tance and its position in the slot be adjusted by means of the screw **L**. When screw **L** is pushed against the bearing block it carries the worm shaft towards the worm wheel axis and the teeth of both worm and wheel are thus brought more closely into engagement with one another. The final setting position for the worm can be locked by means of the nut on the screw. Also, the block has an outer flange pierced by four elongated holes so that the worm shaft assembly is firmly secured axially by the four bolts passing through the holes. Once the engagement between worm and wheel have been set so as to be free of back-lash, a long working period can elapse before readjustment becomes necessary. The second bearing block **M** is almost a thrust races **H-H**, placed at one end of the worm shaft to simplify assembly and maintenance. Radial location of the worm shaft is by means of the long bronze bearing blocks in which the ends of the worm shaft run.

Bearing block **I** carries the ball thrust assembly and it can be pulled out of the fixture body towards the right bringing with it the worm shaft, all in one unit. End thrust adjustment for the running clearance can be obtained by the simple process of placing paper washers in the bottom of the recess **J**, between the shaft end and the end cap **K**. Means are provided on the worm shaft for the taking up of back-lash between worm and worm wheel teeth so that the clearance between these is at the absolute minimum.

The plan view in the drawing shows the method of adjusting the worm axis in relation to that of the worm wheel. Bearing block **I** is shown and it will be seen that its exterior is of square section which fits neatly, top and bottom, in a rectangular slot machined in the side wall of the lower part of the fixture. The bearing block can thus slide horizontally through a short distance duplicate of **I** and can be adjusted by the same means.

The principle on which this fixture works is as follows. The worm and worm wheel assembly in the lower part of the fixture are duplicates of the component worm wheel **A** and the worm hob **N** so that if both worms are rotated at exactly the same speed, the meshing action of both elements will be the same. Since the component is a blank without teeth it must be fed progressively into the hob periphery and arrangements have to be made for driving the lower worm in synchronism with the hob, while permitting the worm wheel blank to be fed into it while rotating. The principle is the same as that of a standard gear hobbing machine.

A side view of the driving connection between the worm wheel hob and the fixture driving worm is shown in Section **Z-Z**, and this part of the fixture is the most interesting. The milling machine mandrel section is at **O** and carries the hob mounted on it together with a spur gear **P**. The end of the fixture worm shaft carries a second spur gear **Q** of the same pitch circle diameter. Connecting the two gears is a third gear **R** and all three gears are held in mesh with one another by means of the connecting links **S** shown. The links form the two sides of a triangle while the third side of the triangle is made up from the structure of the milling machine. It is axiomatic that if a triangular frame is pivotally connected at all three corners, the frame will be rigid. This particular triangular frame has the variation that the third side of the triangle is adjustable in length, since horizontal traversing of the machine table to which the fixture is secured moves the gear **Q** with it. With this arrangement, the machine table can traverse to the right of the mandrel until gear **Q** is in position **Q1**, shown in dotted lines; if the mandrel

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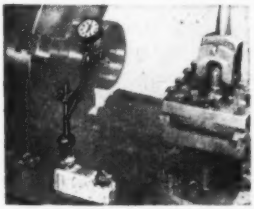

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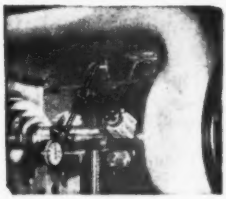

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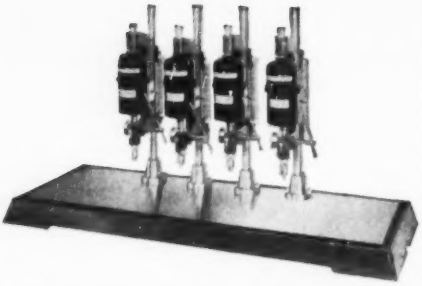

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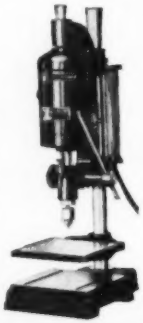

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is rotating, the worm shaft on the fixture will be revolving the whole time, because all three gears in the train will be in mesh with one another.

The links connecting the gear train together can swivel upon their various mountings; the pin **T** carrying gear **P** also forms a swivel upon which the links can turn. The connection of one pair of links to the milling machine mandrel **O** in Section **X-X** is shown and can be seen to be of wide section and fitted with anti-friction bushings **U** which run on the outside diameter of the spacing collars on the mandrel. Gear **R** is also shown in Section **X-X** and the links connecting with the worm shaft are of similar construction to those on the mandrel. In assembling the gear train, a considerable amount of care was taken in boring the hole centers in the links so that the gear teeth were closely meshed and running with minimum back-lash.

Use of the fixture is simple. The ring gear blank is loaded and clamped and the machine table traversed so that the hob is approached closely. The spindle is started so that the mandrel revolves and carries with it the gear train and the worm wheel in the fixture base so that the gear blank is revolving at the correct theoretical speed for meshing with the hob teeth. At a very slow table speed, the blank is fed into the hob, which proceeds to generate the teeth until full depth is reached and indicated by a figure on the table screw feed dial. The feed is tripped and the blank is allowed to rotate a few times in order to remove all spring from the cut. The table is then traversed to the right at a fast speed when the gear can be unloaded.

The fixture has worked extremely well and has produced worm wheels at a high rate of speed comparable to that obtainable from a gear cutting machine.

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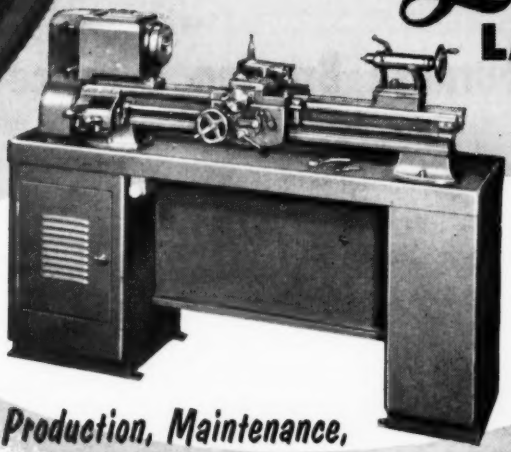

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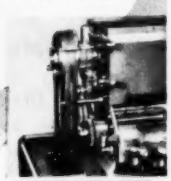

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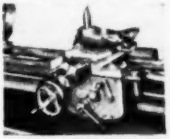

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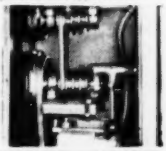

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Modern Furnace Brazing Practice . . . part 2

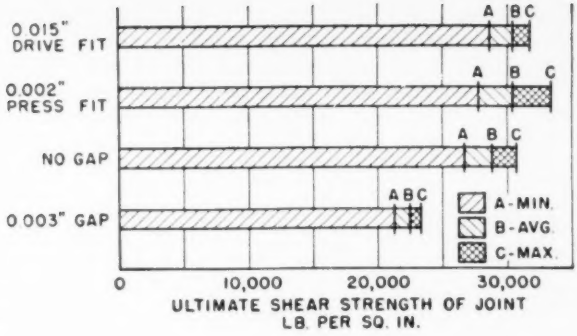
By **H. M. Webber,** Industrial Heating Dept., General Electric Co.

Fits and clearances

Frequently questions are asked regarding the fits and clearances between parts to be assembled for furnace-brazing. Is it necessary to allow a gap in the joint to permit capillary attraction to draw the brazing metal through the joint, or can better results be obtained with metal-to-metal contact, or even a press fit? Inasmuch as there is a variety of conditions to be satisfied, involving types of parent metals, combinations of parent metals, and brazing metals utilized, it is almost impossible to give an over-all prescription which will satisfy all conditions. However, some rules can be given which, in general, will at least keep one out of trouble. Optimum conditions for best strength and tightness are not always adhered to, however, because wider tolerances are sometimes acceptable from the standpoint of results, with the machining cost being lower than when optimum conditions are strived for.

The results of a series of tests to determine the effects of fit on the strength of copper-brazed low-carbon steel assemblies are shown in Fig. 19. Each of the four bars shows the average, minimum, and maximum strength of ten test samples of the pull-out type, made from small rods and disks, with the area of the joint carefully measured so that the strength could be plotted in lb per sq in. shear. The bottom bar shows results with 0.003 in. gap in the joint, but only six of the ten samples were used in plotting the data because the other four had voids in the joints and were not considered representative. This fact alone indicates the undesirability of having gaps of appreciable size in such assemblies. The adjoining bar, for metal-to-metal fit, indicates marked increase in strength. The upper two bars, with light and heavy press fits, show little if any further increase in strength, but at the same time no adverse effects.

From these results and similar experiences, it is generally considered advisable in copper-brazing low-carbon steel to avoid loose fits and to adjust the tolerances for metal-to-metal fit ranging into press fits. In view of the foregoing, and from experiences with



19. Effect of tightness of fit on strength of copper-brazed joints (low carbon steel).

other metals under a variety of conditions, the following guide is offered:

1. Brazing low-carbon steel with copper—size to size to light press fit.

2. Brazing high-carbon steel with copper—0.001 in. loose on diameter to light press fit.

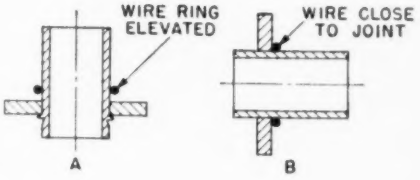
3. Brazing nonferrous or ferrous metals with silver alloys—0.002-0.004 in. loose on diameter.

4. Brazing aluminum alloys with aluminum-silicon alloys—0.012-0.050 in. loose on diameter.

Parent metals

A wide variety of parent metals and combinations of parent metals can be successfully furnace-brazed when proper technique is employed. Many of these can be easily brazed, some present slight difficulties, and others serious difficulties which often can be overcome. There are some, of course, which cannot be handled in this manner at all. The assortment of usable ones, however, is such that electric-furnace brazing enjoys rather wide application. Parent metals commonly furnace-brazed include practically all AISI

20. Brazing with metal rings.



standard steels, stainless and other high-alloyed steels, cast iron, copper, nickel, copper-nickel alloys, copper alloys such as brass and bronze, sterling silver, nickel silver, a few of the alu.ninum alloys, including 2S, 3S, 53S, and 61S, and a magnesium alloy, namely, Dow-metal M (9—bibliography).

Cleanliness

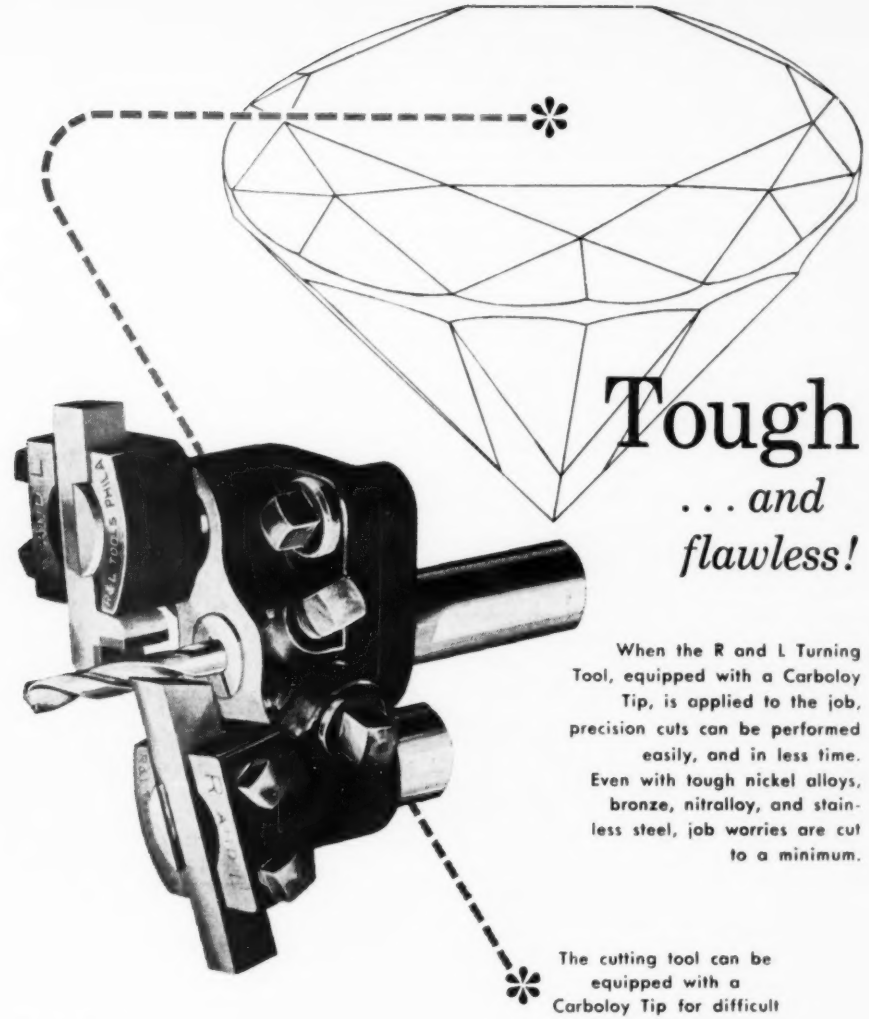
Related to the parent metals is the question of cleanliness. Must grease or oil be removed from the parts prior to assembling for furnace brazing, or can these lubricants be left on? It is common to remove grease, heavy oils, and soapy lubricants. Lubricants containing lead must be removed, as well as those containing sulphur, because of adverse effects on the strength of the bonds. Some lubricants carbonize within the joints upon heating up, and inasmuch as carbon and the brazing metals have no affinity for one another, the carbon impairs strength and tightness of the bonds. Nevertheless, light oils are sometimes left on the parts, particularly for automotive and similar work, where tightness is not a factor and satisfactory results are still obtained. A degreasing operation is sometimes utilized to remove the lubricants, but residues are often left on the parts. A good high-temperature caustic wash with steam rinse often does an effective cleaning job in removing all foreign material from the parts. The need of a good rinse after the caustic wash is emphasized, however, because it would probably be better to leave light oil on the parts than caustic, from the standpoints of obtaining good bonds.

Brazing metals

There is also a wide assortment of brazing metals which are successfully utilized in furnace-brazing work. The bulk of the furnace-brazing applications, however, narrow down to a few commonly used brazing metals, as follows:

1. Copper is used for perhaps 95 per cent of the furnace-brazing output for two reasons. Most of the furnace-brazing jobs are on low-carbon steel, on which copper wets excellently and creeps into joints without the aid of an auxiliary flux. The avoidance of flux, which requires application and subsequent removal, is copper's most important advantage, since most other brazing metals require flux. Its low cost is another factor. Some parent metals require flux even with copper as the brazing metal, if certain alloying elements exceed about 2 per cent total, such as chromium, manganese, silicon, vanadium, and aluminum. However, these alloying elements seldom exceed 2 per cent in the standard steels, and fluxing is generally not necessary for copper.

2. Brass is often suggested as a brazing metal because of its low melting point, but is seldom used. Sometimes it is employed on parent metals which cannot withstand the high temperature required for copper. Zinc distills from the brass, however, which entails three important disadvantages. First, zinc loss results in increased melting point of the brass. The increasing melting point requires that the furnace be operated at 1850 to 1950 F to assure melting of



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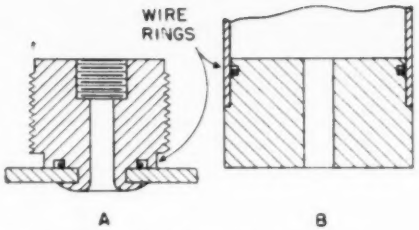
the brass, in which case the temperature might as well be increased another hundred degrees or so to 2050 F, to allow the use of copper, if the parent metal can withstand the extra temperature. Second, zinc attacks heat-resisting alloy parts in furnaces. Third, the zinc oxidizes on the surfaces of the brass even in the protective atmospheres, forming a retaining shell which holds the molten brass within it. This means that a solvent flux must be utilized to assure flowing and wetting, which is accompanied by the expense of its application and subsequent removal.

3. Several phosphorus-copper brazing alloys, some of which also contain silver, are available for use on nonferrous parent metals, which flow at temperatures of 1300 to 1400 F. These brazing metals, because of their phosphorus content, are self-fluxing on copper but usually require auxiliary fluxes when used on brass and other zinc-containing alloys. They are not suitable on ferrous metals because the iron phosphide formed is weak and brittle. Typical proprietary names of such brazing alloys are Sil-Fos,[2] Silvaloy 15,[3] Phosco,[4] and Phos-Copper.[5]

4. Low-melting silver-brazing alloys are available, containing silver, copper, cadmium, and zinc, which are excellent on both ferrous and nonferrous parent metals, flowing at 1175 and 1145 F. Fluxes are practically always required with them. Typical proprietary names are: Easy-Flo,[2] Silvaloy 50,[3] and Sil-Ex[4] (1175 F); Easy-Flo 45,[2] Silvaloy 45,[3] and Sil-Bond[4] (1145 F)—(numbers refer to preceding footnote).

5. Several aluminum-alloy brazing metals (5, 6, 7, 8—bibliography) have been developed by the Aluminum Company of America, with designated numbers and brazing ranges as follows:

[2]*Handy and Harman.*
[3]*American Platinum Works.*
[4]*United Wire and Supply Corporation.*
[5]*Westinghouse Electric Corporation.*



21. **Brazing** with imbedded wire rings.

Number	Composition	Brazing range —deg F
711	Aluminum, silicon, zinc	1160-1185
713	Aluminum, silicon	1100-1135
718	Aluminum, silicon	1070-1080

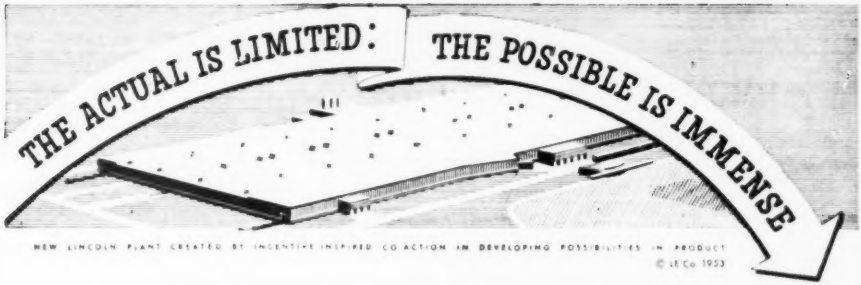
Fluxes

Where fluxes are needed (10, 11—bibliography) it is important that they melt at a temperature below the melting point of the brazing metal, to assure effectiveness. An assortment of fluxes is available from welding and brazing supply houses, and recommendations can be obtained from them, or from suppliers of brazing metals.

Form and location of brazing metals

Brazing metals are of course available in various forms, such as wire, foil, and powder. They are sometimes sprayed on parts with an oxyacetylene gun or electroplated. Location of the brazing metal is an important factor; it is sometimes placed at the joints, above the joints, or even within the joints. A few suggestions for locating the brazing metal will be given.

Wire is used in rings, straight lengths, slugs, and hairpins. Sometimes a large ring lying on a flange at the joint of an assembly, as shown in Fig. 20 (A), will warp and open up. Upon melting, it may run away from the joint or puddle on the flange. To avoid this, the ring is sometimes placed above the joint, made of hard wire and formed slightly undersize to help hold it in place. Upon



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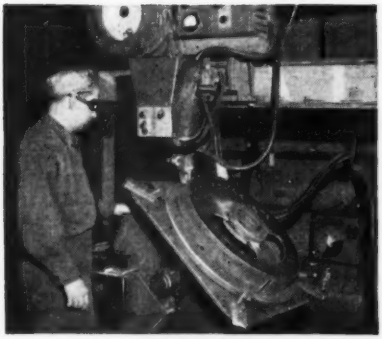

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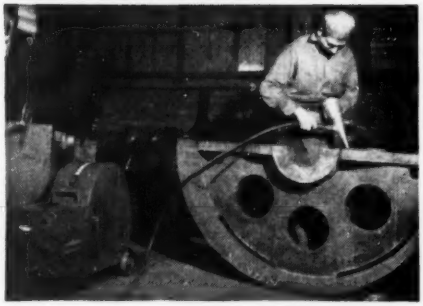

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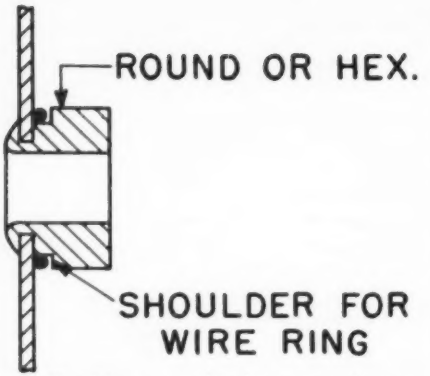


22. Shoulder on spud locks ring in place.

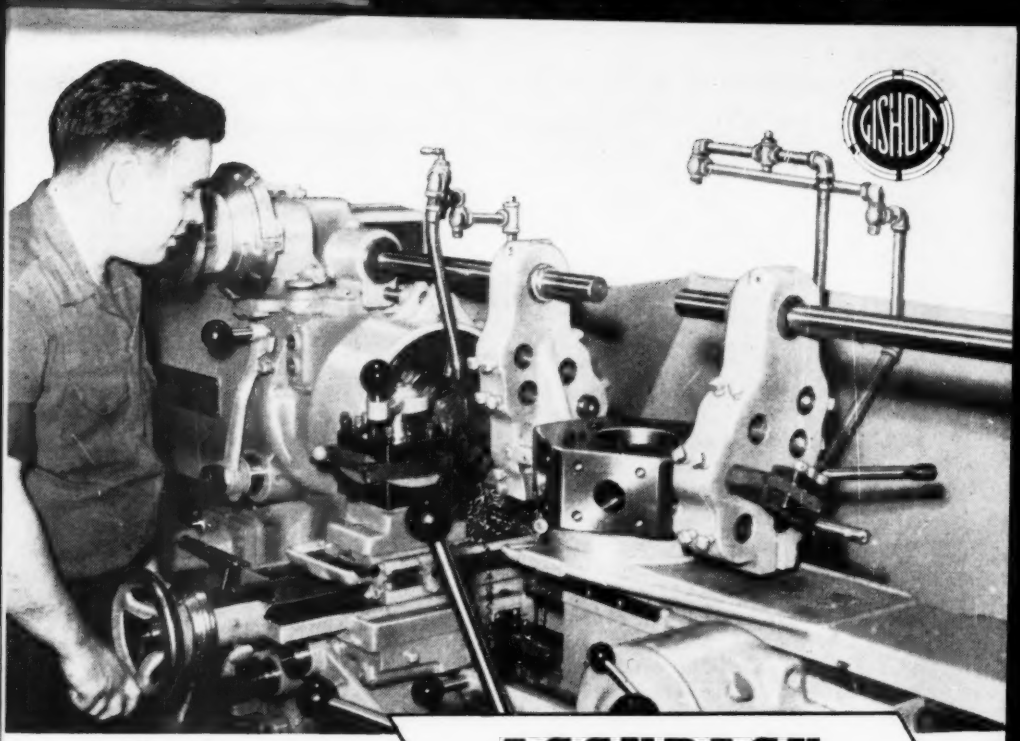
melting, the brazing metal runs down the side and is drawn into the joint by capillary attraction. Even if it should warp a bit, it will probably tilt and hang in place to give the same desirable result. This suggestion for assemblies with vertical axes does not apply for assemblies with horizontal axes, however. In such cases, as at B, care should be taken to have the wire ring placed snugly against the flange so that it will be drawn into the joint upon melting. Even then, large-diameter rings, say, 2 in. dia. or more, have a tendency to warp and flow away from the joint. In such instances, half-rings of large-size wire, placed on the top side of the joint, generally overcome the difficulty and work successfully.

A highly recommended method for locating rings is to embed them in grooves cut in parts as they are being machined, as illustrated in Fig. 21. So locked, the rings cannot warp and get away. The brazing metal has no alternative but to creep through the joints as desired, showing up at extremities to give visual indication of good bonds.

A modification of the foregoing suggestion is to provide a shoulder on a spud, Fig. 22, to lock the ring against the shell. In addition, the method is especially desirable for hexagonal fittings. Hexagonal rings are difficult to form, keep in shape, and to apply on parts. A round shoulder cut on hexagonal stock facilitates the use of round rings, which are easy to form, handle, and apply.

Wire is cut in short lengths and used as slugs in numerous cases. In Fig. 23 such slugs are shown at the arrows, and are used for bonding the brackets which have been projection-welded to the shell for extra strength, the assembly shown being a dome for a hermetically sealed refrigerator. When the brackets are stamped, they are formed with lips at the top to provide recesses for the slugs. The slugs are positioned easily and inexpensively by the operator, and the recesses form good reservoirs for the molten brazing metal. Another feature shown in Fig. 23 is the spuds in the shell, which are provided with shoulders on which copper-wire rings have been placed, in the fashion indicated in Fig. 22.

23. Wire slugs are dropped into receptacles on the brackets.



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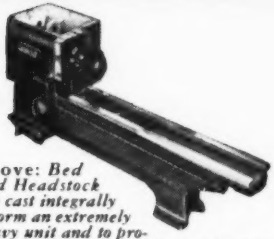

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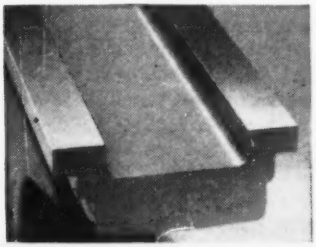

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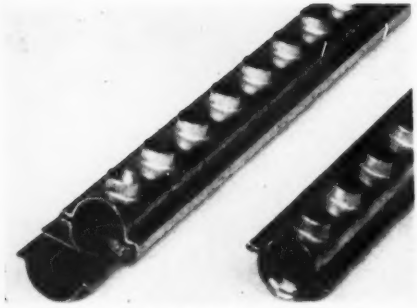
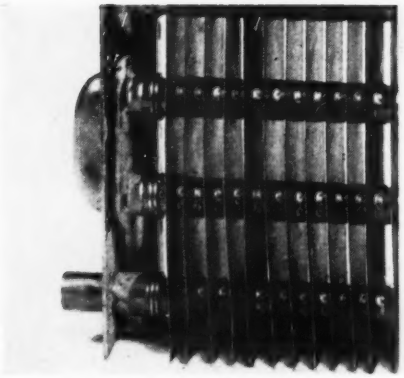


24. Copper strip used for brazing two stampings.



25. Powdered brazing metal mixed with a liquid vehicle was used on this steel-fin condenser.

Foil is used as a brazing metal in the form of wide strip, narrow strip (Fig. 24), clips, etc. For example, copper foil is commonly used between two steel sheets for brazing flat evaporator plates. In Fig. 24, which illustrates a header for a steel-fin condenser for refrigerators, during assembly (left) and after crimping (right), a piece of copper strip serves as a convenient and positive means of locating the brazing metal between the two stampings.

Brazing metals in the form of powder are commonly utilized, sometimes dry, but usually mixed with a liquid vehicle, such as clear lacquer and thinner, or propylene glycol. This "paste" is commonly daubed on with a brush, applied with a pneumatic gun, sprayed on, or the parts are dipped in it. An advantage of this form of brazing metal is that it can be applied to irregularly shaped joints to which it is difficult to apply brazing metal in any other form. 150-mesh copper powder is commonly used with lacquer, while 500-mesh copper or copper-oxide powder is commonly used with propylene glycol.

The lacquer hardens and is sometimes preferred for that property. In Fig. 25 it helps lock copper-wire rings at the joints so they won't move away in handling around the shop prior to brazing. It also starts the wetting action to help draw the copper from the rings into the joints, as well as serving as a supply of brazing metal in itself. The propylene glycol does not harden like lacquer, and is occasionally preferred for that property, as well as the fact that it keeps the copper in suspension better than lacquer, and does not tend to gel. The lacquer paste stays in place when the assembly strikes the heat, but the propylene glycol paste has a tendency to run as soon as it gets warm, sometimes allowing brazing metal to drip off vertical surfaces or parts before it melts. Commercially mixed pastes are also available (16—bibliography), a typical proprietary name being Cubond.[6]

Any brazing metal which can be formed into wire can be melted and sprayed from an oxyacetylene gun. An example in which brazing metal has been applied in this manner is the hollow steel airplane-propeller blade shown in section in Figs. 26 and 27.

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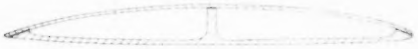
[6] *The Glidden Company, chemicals-pigments-metals division.*

26. Furnace-brazed steel propeller blade.



27. Three long seams are copper-brazed.

Three long seams between the forging and sheet-metal member are copper-brazed. Prior to assembly, surfaces near the edges and along the center are grit-blasted and then sprayed with copper to supply the brazing metal which, after assembly, is within the joints. This method has been found better than any other for this particular product.

Electroplating is often suggested and sometimes used successfully for applying brazing metals to assemblies. An example of this is shown in Fig. 28 which is a telephone switchboard bracket. Copper-plating of the three small pins in the left-hand view eliminates the use of tiny copper-wire rings, which are difficult to handle. After brazing (right), copper is seen on the body members near the joints, indicating that bonds have been obtained. Electroplating must be used cautiously because it introduces a sandwich of brazing metal within the joint, while instead, it is commonly preferred, when copper-brazing low-carbon steels, to have intimate steel-to-steel contact and require the brazing metal to flow in by capillary attraction. Also, when copper melts within the joints, it may run out and leave voids, impairing the strength and tightness, unless an external surplus is available to make up for this. Then, too, electroplating usually varies widely in thickness, and thus in its amount. Nevertheless, there are numerous cases in which this method is used to good advantage in furnace brazing.

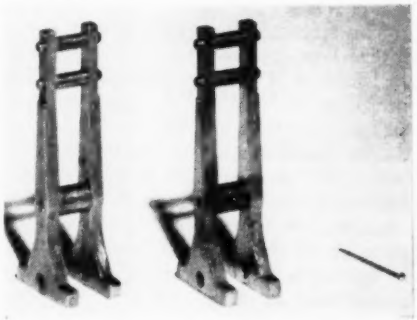
Physical properties

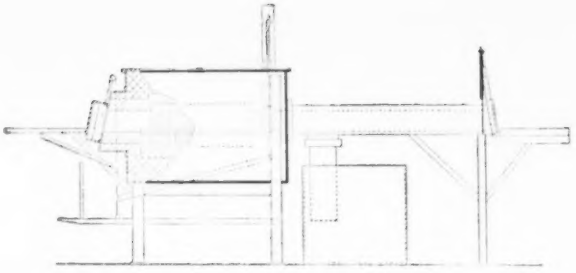
Most metals, unless they are of the air hardening type, come from the brazing furnace uniformly dead-annealed. This condition is generally considered highly desirable, but occasionally the loss of cold-worked hardness in the parts is detrimental to the job. Sometimes this makes it necessary to abandon a furnace-brazing project and use a local means of heating, such as torch brazing or induction brazing. There are some ways to overcome this difficulty, however, and these are as follows:

1. Cold working of parts after furnace brazing will give just as good hardness and stiffness as though the cold working were done before brazing and the parts did not go through the furnace. The pulley, Fig. 4, is an example.

2. Cyanide hardening of low-carbon

28. Using electroplating for applying brazing metals.





29. Longitudinal sketch of typical box type brazing furnace.

steel assemblies after furnace brazing stiffens them somewhat. This method is used in the fabrication of automotive and tractor rocker arms and other such parts.

3. If the parent metal contains sufficient carbon to be heat-treatable, heat-treating after furnace brazing will of course improve the physical properties. It appears, in fact, that the same properties can be obtained by heat-treatment after furnace brazing as can be obtained by heat-treating as-received stock. A large number of furnace-brazed assemblies are heat-treated after brazing, with satisfactory results.

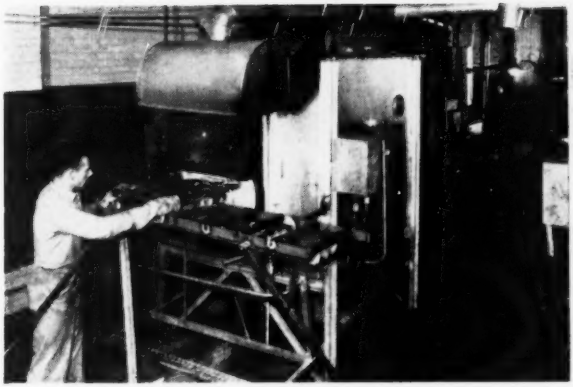
Air-hardening steels harden upon quick transfer from the heating chamber to the cooling chamber in a copper-brazing furnace, and emerge from the cooling chamber in normalized condition, with high strength in the parent metal.

The strength of copper-brazed bonds after heat-treatment is, in general, satisfactory if the assemblies are fairly uniform in section so that quench stresses are not set up in the bonds. Although the results of some work have been published (1, 2, 3, 4, 12, 13—bibliography) there is still room for considerably more work in this direction. Good strength has been obtained in heat-treated low-carbon carburized assemblies as well as in medium-carbon ones. The apparent unit strength within a bond has been demonstrated to be considerably affected by the type of test specimen utilized. Best data for a given job are determined by building actual samples of the product and testing them to destruction.

Furnace-brazing equipment

Various types of brazing furnaces and protective-atmosphere-producing equipments are used in this work. The most common types of furnaces are the box, mesh-belt, and roller-hearth-conveyer types, but other types are occasionally used. A typical setup consists of a furnace with cooling chamber attached, transformers if needed to give proper voltage on the electric heating units, power control panels, temperature control instruments, and a suitable atmosphere-gas-producing unit.

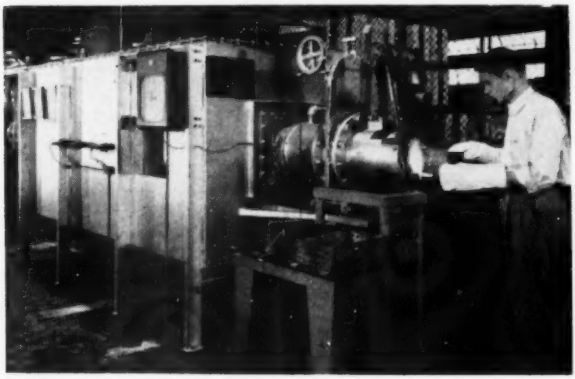
A typical box furnace is shown in Figs. 29 and 30. It has a heating chamber and water-jacketed cooling chamber attached, with three doors. The two end doors are normally closed to keep the gas in, and the refractory center door is normally closed to keep the heat in, thus assuring longer working length and better operating economy than if it were not there. The box furnace with cooling chamber is the most flexible type furnace built. It is good not only for furnace brazing but for bright an-



30. Steel pulleys, ready for brazing, are pushed into heating chamber of box type furnace.

nealing, bright normalizing, scale-free hardening, and sintering. For most of these operations, the trayload of work is pushed into the heating chamber, where it rests on hearth rails until the work is heated through. Then it is subsequently pushed into the cooling chamber, and moved intermittently along, finally being pulled out the discharge door. For hardening, hinged-bottomtrays are employed. The trayload of hot work is pushed out over the quench chute, the bottom drops, and the work falls through the quench chute into oil, being caught by a basket which is then moved sideways, pulled out, and the work is dumped into tote boxes. The tray is pulled out the discharge door. The box furnace is best suited for small rates of production or experimental work. Sometimes two or three of them are mounted side by side, as production requirements increase. This type of furnace is practical and economical to operate on light, medium, or heavy-weight parts.

A similar manual-pusher-type furnace is that shown in Fig. 31. It differs, however, in that it has a tubular alloy retort through which the trays are pushed and purging vestibules at the ends so that pure, dry hydrogen or dissociated ammonia atmosphere within the retort will not be contaminated. This type furnace, therefore, is used successfully for stainless and other



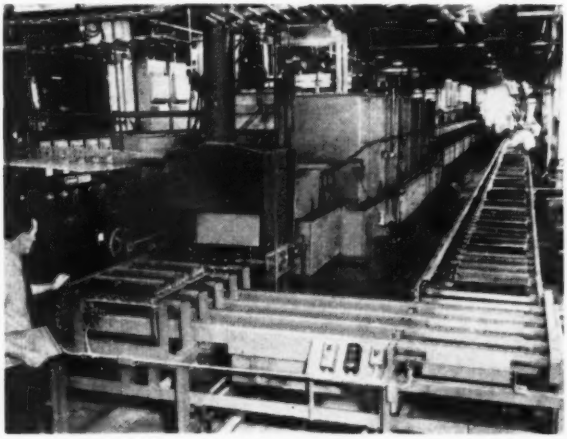
31. Pusher tray tubular retort type furnace for bright brazing, hardening, annealing and sintering stainless and other high alloy steels.

32. Mesh belt conveyor type brazing furnace.

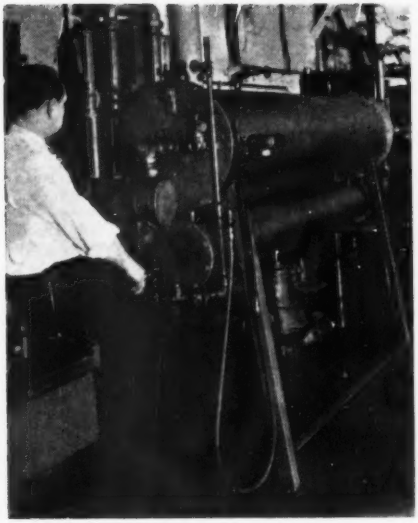
high-alloy steels, in bright brazing, hardening, annealing, and sintering. Other types of furnaces are also used for these applications, when properly built and operated, such as the box-, mesh-belt-conveyor-, bell-, and pit types.

The mesh-belt-conveyor type furnace, Fig. 32, is built similarly to the box type, with heating chamber and cooling chamber attached. It differs in that it has a continuously traveling wire-mesh belt, which slowly carries work through the furnace. In this type, all doors throughout the furnace are normally open to clear the work; thus the gas consumption is higher than in the box type, in order to maintain suitable purity of protective atmosphere within the furnace. Because the hottest section of the belt is relatively weak, this type of furnace is limited to handling light and medium-weight parts, in order to obtain reasonable belt life. Operators load work on the belt at the charging end of the furnace, and either lift it off at the discharge end or allow it to dump into tote boxes. The mesh-belt furnace is utilized for larger rates of production than the box furnace. It appeals to manufacturers because of its continuous feature, which gives constant movement and timing of the work, with no handling of trays.

The roller-hearth-conveyor type brazing furnace, Fig. 33, has a driven roll table throughout its length, on which trayloads of work are carried through continuously. The end doors



33. Steel fin refrigerator condensers being furnace brazed in roller hearth conveyor type furnace with return conveyor and transfer tables.



34. Exothermic type atmosphere gas producer.

are normally closed, but the throat doors are adjusted open to clear the work. This type of furnace is best suited for high rates of production, such as on automotive and refrigeration work. It is practical and economical to operate on light, medium, and heavy-weight parts. The rolls turn continuously, thus redistributing their stresses and staying straight. They can carry relatively heavy loads and still have long life. The trays are simply rolled through without pushing and pulling stresses, and they, too, have long life. The maintenance cost per pound of work is, therefore, lowest in this type furnace.

Most roller-hearth furnaces have automatic charging and discharging of the trays, and many of them are equipped with a return conveyor, as shown in Fig. 33, with transfer tables to carry the trays from the furnace line to the conveyor line, and vice versa. The trays go around the circuit automatically, the only labor required being that for removing brazed assemblies and loading prepared ones. Thus the roller-hearth-type furnace is the most economical type to operate, from all standpoints—personnel, economy, and maintenance—per pound brazed.

Although hydrogen and its lower-cost substitute, dissociated ammonia, are excellent gases for furnace brazing, one of the most important reasons for the widespread success of the process is the development of gas producers which reform hydrocarbon gases into suitable low-cost protective atmospheres. Partially combusted fuel gas, such as coke-oven gas, natural gas, or propane, formed in an exothermic gas producer such as that shown in Fig. 34, is moderately reducing and very low in cost. It is utilized for most of the furnace-brazing applications, particularly on low-carbon steels which constitute the bulk of the work. The gas consists of about 15 per cent hydrogen, 10 per cent carbon monoxide, 5 per cent carbon dioxide, 1.5 per cent methane, and 3 per cent water vapor, the remainder and largest portion being nitrogen. This gas gives good wetting action and good bonding, producing bright work on low-carbon steel. It will, however, decarburize medium or high-carbon steels, leaving a soft skin after heat-treatment, which may have to be ground or machined off afterward. For such applications, other protective atmospheres are available which will not decarburize during the furnace-brazing attachment, and if the parts are hardened in the same atmosphere, they will have hard surfaces.

BIBLIOGRAPHY

1. "Electric-Furnace Brazing: Where and Why to Use It," by H. M. Webber, *The Iron Age*; series of 11 articles, vol. 142, nos. 10, 11, 12, 18, 19, 21, 23, and 26; vol. 143, nos. 5, 11, and 14 (Sept. 8, 1938 to April 6, 1939); also reprinted by General Electric Company, publication GEA-3193C.
2. "Properties of Brazed 12 Per Cent Chrome Steel," by F. C. Kelley, *The Iron Age*, vol. 144, nos. 18 and 19, Nov. 2 and Nov. 9, 1939, pp. 33-35 and 34-35.
3. "A Study of Furnace Brazing as Applied

to 12 Per Cent Chromium Low-Carbon Steel," by T. H. Gray, Transactions of the ASM, vol. 39, 1947, pp. 453-487.

4. "Heat Processing Easily Oxidized Metals," by F. C. Kelley, *The Iron Age*, vol. 161, no. 21, May 20, 1948, pp. 84-89.

5. "Brazing the Aluminum Alloys," by G. O. Hoglund, *The Welding Journal Research Supplement*, vol. 19, April, 1940, pp. 123s-125s.

6. "New Developments in Aluminum Brazing," by Mike A. Miller, *Metal Progress*, vol. 48, no. 3, September, 1945, pp. 477-483 and 528.

7. "Brazing Aluminum Alloys," by H. R. Clauser, *Materials and Methods*, vol. 27, no. 5, May, 1948, pp. 78-82.

8. "Furnace Brazing Aluminum Refrigerator Parts," by J. N. Woolrich, *The Iron Age*, vol. 163, no. 21, May 26, 1949, pp. 62-65.

9. "Economical Joining of Magnesium Possible Through New Brazing Method," by Paul Klain, *Materials and Methods*, vol. 27, no. 6, June, 1948, pp. 83-87.

10. "The Welding Handbook," The American Welding Society, New York, N. Y., 1942, pp. 591-604.

11. "Metals Handbook," American Society for Metals, Cleveland, Ohio, 1948, pp. 78-81, 273-280, 294-298, 782-785, 883-884, 1035, 1103-1104 and 1113.

12. "Properties of Copper-Brazed Joints," by G. B. Wilkes, Jr., *The Iron Age*, vol. 162, no. 14, September 30, 1948, pp. 44-51.

13. "Factors Controlling the Strength of Brazed Joints From Final Report NRC-560," by C. Rhyne, Jr., The Welding Journal, vol. 25, no. 7, July, 1946, pp. 599-611.

14. "Continuous Furnace Brazing," by C. L. West, *American Machinist*, vol. 91, nos. 14, 15, 16, July 3, July 17, July 31, 1947, pp. 124-125, 122-124, 98-100.

15. "Controlled-Atmosphere Furnace Brazing," by A. K. Phillippi, *Steel Processing*, vol. 31, no. 2, February, 1945, pp. 111-114.

16. "Copper Paste Lowers Brazing Costs," by Dan Reebel, *Steel*, vol. 127, no. 3, July 17, 1950, pp. 82, 83 and 98.

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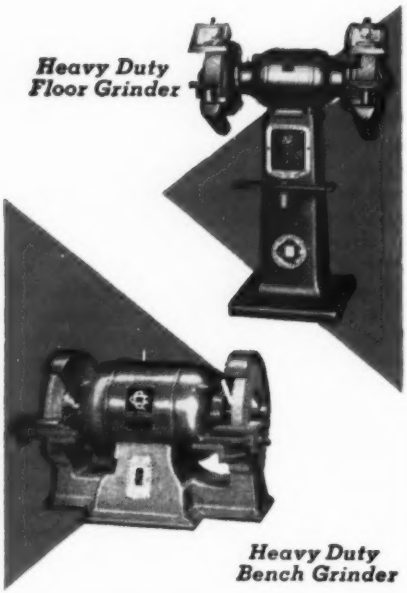

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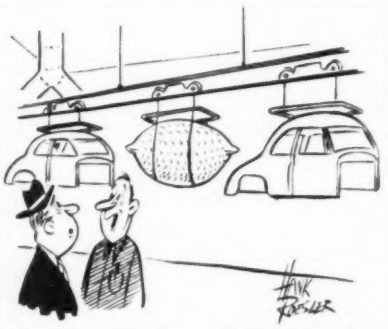

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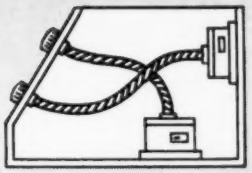

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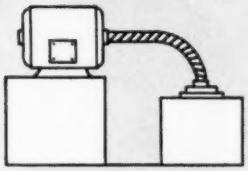

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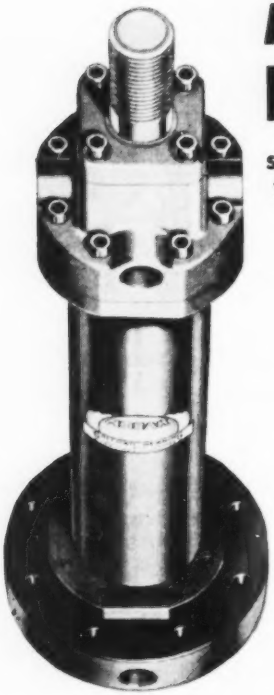

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Mechanical Properties of Steel

This table of figures represents AVERAGE results compiled from many tests. It is offered as a general guide to the PROBABLE physical expectancy of the steels listed. IT MUST BE UNDERSTOOD THAT IN INDIVIDUAL TESTS THESE STEELS MAY DEVELOP RESULTS DIFFERING WIDELY FROM THE AVERAGES SHOWN. The average properties shown are based on a 1" Rd. section except for the heat treated steels on which the size range is shown.

The size of the section, rolling temperature, permissible variation within analysis limits and atmospheric temperature at a time of rolling all influence the final physical properties of any steel. The physical properties of cold drawn steel are governed largely by the amount of size reduction during cold drawing. Dependable mechanical properties can be secured only through carefully controlled heat treatment.

CARBURIZING OR LOW CARBON GRADES

AISI No.	Condition of Steel	Tensile Strength psi	Yield Point psi	% Elong. in 2"	%Red. of Area	Hardness Brinell	Hardness Rockwell
Low Carbon Steel							
	Hot Rolled, As Rolled	63,000	46,000	38	62	126	B72
	Cold Drawn, As Drawn	77,000	65,000	20	60	156	B83
C1015							
	Hot Rolled, As Rolled	61,000	45,500	39	61	126	B72
	Cold Drawn, As Drawn	74,000	62,000	24	57	143	B79
C1018							
	Hot Rolled, As Rolled	69,000	48,000	38	62	143	B79
	Cold Drawn, As Drawn	82,000	70,000	20	57	163	B88
	Carburized at 1700°F., cooled in box, reheated to 1425°F., water quenched, tempered at 350°F.—						
	Core properties:	92,000	56,000	27	48	197	B91
C1019							
	Hot Rolled, As Rolled	71,000	51,000	37	60	149	B81
	Cold Drawn,	84,000	72,000	20	56	170	B87
C1020							
	Hot Rolled, As Rolled	65,000	43,000	36	59	143	B79
	Cold Drawn	78,000	66,000	20	55	156	B83
B1112							
	Cold Drawn, As Drawn	82,500	71,000	15	43	170	B87
B1113							
	Cold Drawn, As Drawn	83,500	72,000	14	40	170	B87
C1117							
	Hot Rolled, As Rolled	70,600	44,300	33	63	137	B76
	Cold Drawn, As Drawn	84,000	74,000	21	52	170	B87
2317							
	Hot Rolled, As Rolled	85,0000	56,000	29	60	163	B85
	Cold Drawn, As Drawn	95,000	75,000	25	58	197	B93
	Carburized at 1700°F., cooled in box, reheated to 1525°F., oil quenched, tempered at 300°F.—						
	Core properties:	137,000	107,000	22	52	285	C30
3115							
	Hot Rolled, As Rolled	76,000	60,000	32	69	156	B83
	Cold Drawn, As Drawn	87,000	78,300	25	62	163	B85
	Carburized at 1700°F., cooled in box, reheated to 1500°F., oil quenched, tempered at 300°F.—						
	Core properties:	124,000	82,000	22	56	269	C28
4615							
	Hot Rolled, As Rolled	82,000	62,000	28	65	183	B90
	Cold Drawn, As Drawn	99,000	84,600	15	61	207	C15
	Carburized at 1700°F., cooled in box, reheated to 1550°F., oil quenched, tempered at 300°F.—						
	Core properties:	110,000	80,000	25	61	229	C20

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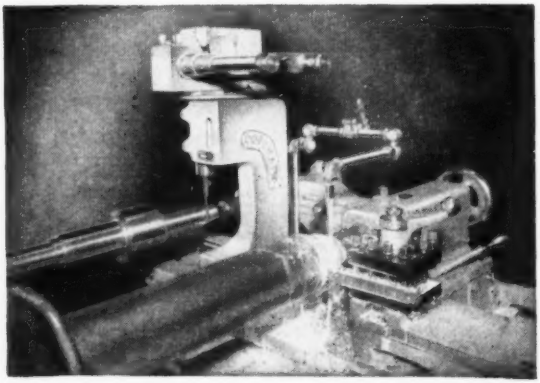

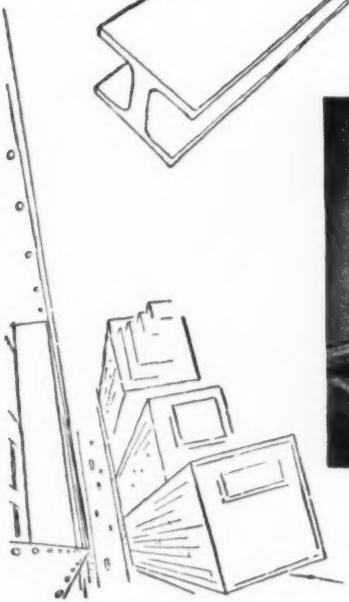

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Mechanical Properties of Steel

AISI No.	Condition of Steel	Tensile Strength psi	Yield Point psi	% Elong. in 2"	% Red of Area	Hardness Brinell	Hardness Rockwell
(Continued)							
4620							
	Hot Rolled, As Rolled	85,000	63,000	28	64	183	B90
	Cold Drawn, As Drawn	101,000	85,000	22	60	207	C15
	Carburized at 1700°F., cooled in box, reheated to 1550°F., oil quenched, tempered at 300°F.—						
	Core properties:	120,000	89,000	22	55	248	24
4815							
	Hot Rolled, As Rolled	105,000	73,000	24	58	217	C18
	Cold Drawn, As Drawn	110,000	95,000	23	55	223	C19
	Carburized at 1700°F., cooled in box, reheated to 1525°F., oil quenched, tempered at 300°F.—						
	Core properties:	148,000	125,000	18	53	311	C33
8620							
	Hot Rolled, As Rolled	93,000	65,000	25	63	192	B92
	Cold Drawn, As Drawn	102,000	85,000	22	58	212	C16
	Carburized at 1700° F., cooled in box, reheated to 1550°F., oil quenched, tempered at 300°F.—						
	Core properties:	119,000	91,000	21	50	262	C27
	MEDIUM CARBON OR DIRECT HARDENING STEEL						
C1035							
	Hot Rolled, As Rolled	85,000	54,000	30	53	183	B90
	Cold Drawn	92,000	79,000	25	50	201	B94
	Water Quenched 1550°F.—Tempered						
	1000°F.	103,000	72,000	23	59	201	B94
C1040							
	Hot Rolled, As Rolled	91,000	58,000	27	50	201	C15
	Cold Drawn	100,000	88,000	17	42	207	C15
	1" Rd. Water Quenched 1550°F.—Tempered						
	1000°F.	113,000	86,000	23	62	235	C22
C1042							
	Hot Rolled, As Rolled	93,000	59,000	26	50	201	B94
	Cold Drawn	102,000	89,000	16	40	207	C15
	1" Rd. Water Quenched 1550°F.—Tempered						
	1000°F.	116,000	90,000	22	60	235	C22
C1045							
	Hot Rolled, As Rolled	98,000	59,000	24	45	212	C18
	Cold Drawn, As Drawn	103,000	90,000	14	40	217	C18
	Water Quenched 1500°F.—Tempered						
	1000°F.	120,000	90,000	18	52	240	C22
C1095							
	Hot Rolled, As Rolled	142,000	83,000	8	18	293	C28
	Water Quenched 1450°F.—Tempered						
	800°F.	200,000	138,000	12	37	388	C42
C1137							
	Hot Rolled, As Rolled	92,000	57,000	27	61	192	B92
	Cold Drawn, As Drawn	105,000	90,000	15	38	207	C15
	Oil Quenched 1550°F.—Tempered						
	1000°F.	112,000	88,000	21	56	255	C25
C1141							
	Hot Rolled, As Rolled	97,000	59,000	25	52	201	B94
	Cold Drawn	110,000	93,000	14	40	223	C19
	1" Rd. Oil Quenched 1550°F.—Tempered						
	1000°F.	126,000	100,000	19	54	269	C27
2330							
	Hot Rolled, As Rolled	105,000	68,000	21	50	207	C15
	Cold Drawn, As Drawn	124,000	119,000	12	43	223	C19
	Oil Quenched 1525°F., Tempered						
	1000°F.	131,000	106,000	20	57	262	C26
3140							
	Hot Rolled, Annealed	96,000	64,000	26	56	197	B93
	Annealed and Cold Drawn	104,000	91,000	17	48	212	C16
	Oil Quenched 1550°F.—Tempered						
	1000°F.	149,000	128,000	16	45	302	C32

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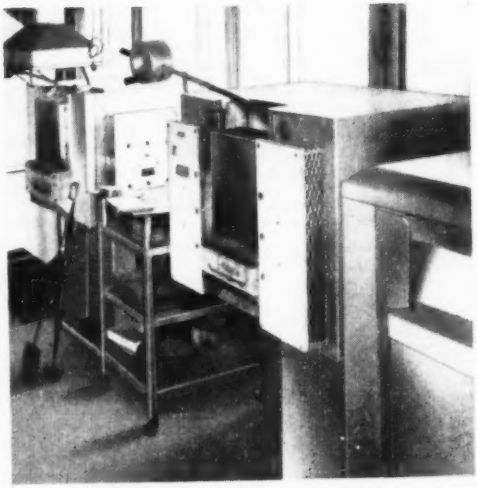

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(Continued)							
3150							
	Hot Rolled, Annealed	104,000	73,000	19	50	212	C16
	Oil Quenched 1550°F.—Tempered 1000°F.	155,000	132,000	14	42	311	C33
4130							
	Hot Rolled, Annealed	90,000	60,000	30	45	183	B90
	Cold Drawn and Annealed	98,000	87,000	21	52	201	B94
	1" Rd. Water Quenched 1575°F.—Tempered 1000°F.	146,000	133,000	17	60	293	C31
	.250" Thick Sheet, Water Quenched 1550°F.—Tempered 1000°F.	152,000	138,000	12	—	302	C32
4140							
	Hot Rolled, Annealed	90,000	63,000	27	58	187	B91
	Annealed and Cold Drawn	102,000	90,000	18	50	223	C19
	Oil Quenched 1550°F.—Tempered 1000°F.	153,000	131,000	16	45	302	C32
4150							
	Hot Rolled, Annealed	100,000	66,000	21	51	197	B93
	Oil Quenched 1550°F.—Tempered 1000°F.	158,000	134,000	14	42	311	C33
Ryeut							
	Hot Rolled, Annealed	102,000	67,000	20	50	212	C16
	Annealed and Cold Drawn	112,000	94,000	16	44	223	C19
	Oil Quenched 1550°F. Tempered 1000°F.	160,000	135,000	14	41	311	C34
4340							
	Hot Rolled, Annealed	101,000	69,000	21	45	207	C15
	Annealed and Cold Drawn	111,000	99,000	16	42	223	C19
	Oil Quenched 1550°F.—Tempered 1000°F.	182,000	162,000	15	40	363	C39
E52100							
	Hot Rolled, Annealed	100,000	81,000	25	57	192	B92
	Oil Quenched 1575°F.—Tempered 300°F.	———	———	—	—	——	C63
E6150							
	Hot Rolled, Annealed	91,000	58,000	22	53	183	B90
	Oil Quenched 1550°F.—Tempered 1000°F.	155,000	132,000	15	44	302	C32
8640							
	Hot Rolled, Annealed	92,000	61,000	27	57	192	B92
	Oil Quenched 1550°F.—Tempered 1000°F.	148,000	127,000	15	42	302	C32
8642							
	Hot Rolled, Annealed	93,000	63,000	27	57	192	B92
	Annealed and Cold Drawn	105,000	90,000	18	49	223	C19
	Oil Quenched 1550°F.—Tempered 1000°F.	149,000	128,000	16	45	302	C32
8650							
	Hot Rolled, Annealed	99,000	58,000	20	48	197	B93
	Oil Quenched 1550°F.—Tempered 1000°F.	155,000	132,000	14	42	311	C33
9255							
	Hot Rolled, Annealed	115,000	78,000	22	45	223	C20
	Oil Quenched 1625°F.—Tempered 1000°F.	180,000	160,000	15	32	352	C38

Courtesy: Joseph T. Ryerson & Son, Co.

Mechanical Counters Aid Production Control

By Francis A. Westbrook

THE USE of mechanical counters on machine tools and other metal working machines has increased greatly during recent years and they now play so important a part in mass production that it is hard to see how many of the practices of modern management would be possible without them. Among other things they are a practical necessity for production control, and where incentive piece rates are in force.

One of the most useful is the predetermined type of counter which is readily installed on existing machines. It is designed to make or break a contact when the preset quantity of production has been reached. It either shuts down the machine or signals the operator by means of a bell or light. It is, furthermore, possible to install the counter so that until it has been reset for the next run the signal will continue in order to avoid having the operator start his machine without resetting. The design permits easy resetting.

Such predetermining counters are available with one or two rows of figures, known as single or double deck. With the single deck type only the predetermining figures are shown, and with the double deck the second set of figures totalizes the job lot or daily, weekly or monthly production. In this way it is possible to figure piece work earnings, to keep track of production and control it, and also for the foreman or operator to see at a glance whether the machine is operating at full efficiency. If its production is not what it should be it may be due to trouble of some kind, or due to the operator.

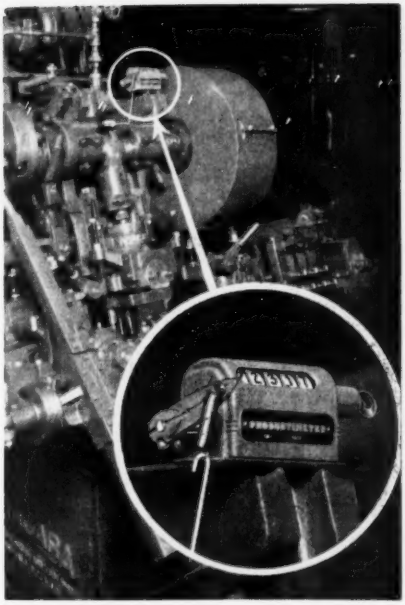
An example of a practical use of the predetermined double deck counter would be where an order for, say, 5000 pieces is in production which is to be packed in quantities of 250. Such a counter would have the predetermining unit set at 250 and the totalizing reading would be noted at the start of the run. When 250 pieces have been produced the machine is automatically stopped or a signal given. The batch of 250 is taken away, the predetermining figures are reset and the run started again. This is repeated for twenty runs, after which the totalizing figures will read 5000 more than at the beginning,

1. A reverse stroke counter installed on a Brown & Sharpe automatic screw machine.

which gives a convenient check on when the order has been filled and prevents under or over production.

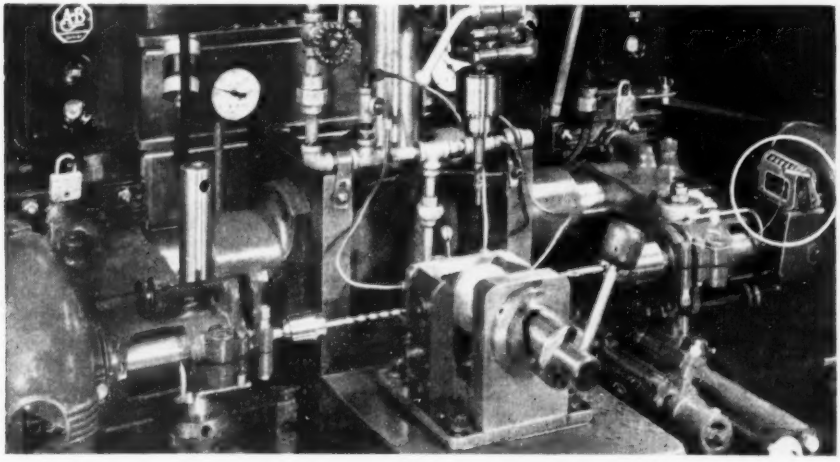
Obviously this saves, also, a complete operation of counting or weighing which may involve considerable handling. Insofar as the counter prevents all chance of under production it saves an important amount of time and expense in setting up the machine, or perhaps several machines, again to complete an under run. Waste due to over runs is also eliminated.

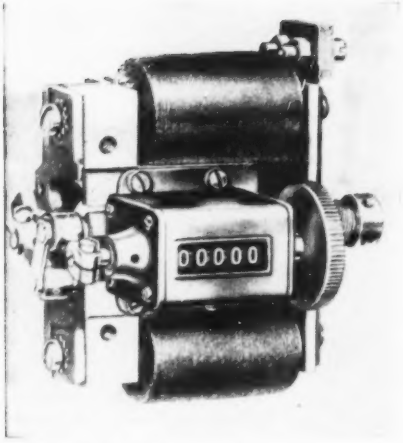
Stroke and revolution models of this type of counter are available with single



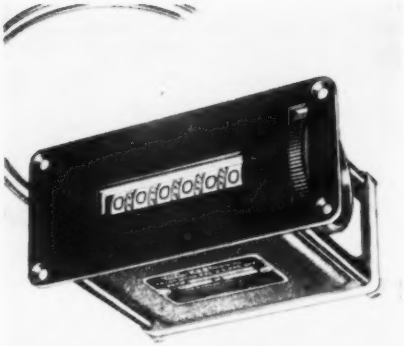
2. A stroke counter with tumbler lock **reset,** installed on a heavy duty Niagara punch press.

3. A stroke counter installed on a special air-feed boring machine using three Delta drill press heads.

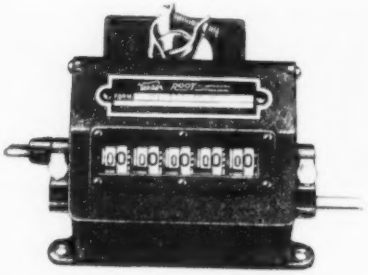




4. **Electrical reset counter.**



5. **Reset magnetic counter** for panel mounting in groups to report on machines in remote locations.



6. **Predetermining counter.**

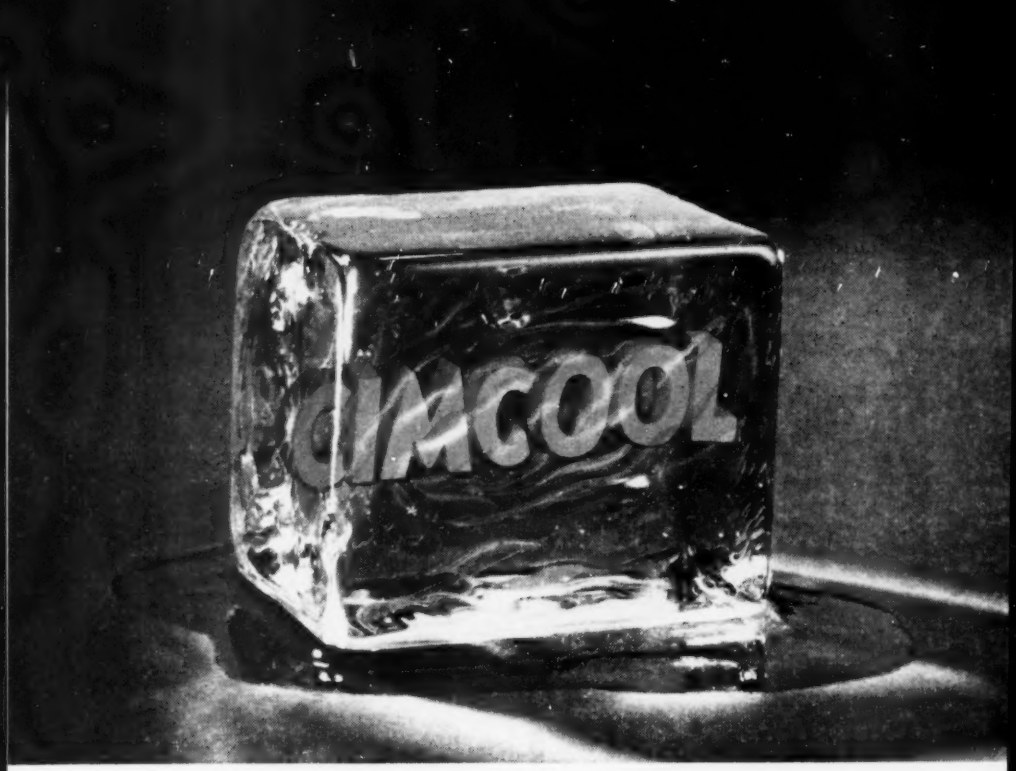
or double decks. Revolution models are, generally, used on coil winders, wire measuring machines, wire reeling, etc. Stroke models are suitable for screw machines, threading machines, drill presses, turret lathes, punch or hydraulic presses, wire and bar cutting machines, riveting machines, shears, and so forth.

The predetermined type of counter, sometimes referred to as a predetermined batching unit (Trumeter) or productimeter (Durant), is a late development made by several concerns (including Veeder-Root) and is probably more widely purchased now than any other type for mass production operations in the metal industries.

Another kind of reset magnetic counter (Veeder-Root, Durant) is designed for mounting in a panel at a distance from the machine at a central point with a group of similar counters to indicate the production of a number of machines. Such an arrangement is very convenient for remotely situated machines. Or it might, for example, be especially valuable for the machines in a production line where it is important to know with accuracy, and at all times, that the output of each machine is exactly right. In this way it is possible to keep the flow of production smooth and uniform, and often to spot incipient trouble without shutting down the whole line. The panel may be located in the foreman's office where he can keep track of what is going on outside.

Counters are also available in multiple units with one unit for each shift and an additional unit to give the total quantity of a run or batch. These also can be applied to a wide variety of machines and can count strokes, revolutions, pieces, or almost anything that is desired.

As a matter of fact a great many



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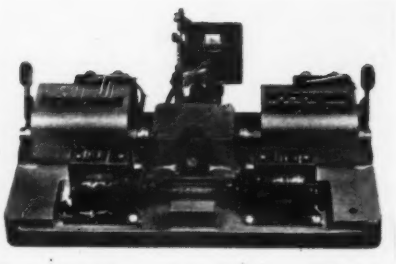

7. "Trumeter" batching unit without cover.

models of counting devices are on the market, many of which are standard products. Many applications which appear to be entirely new, and may well be so, can be handled by standard or semi-standard counters. It is also true that many machines and products for which counters did not at first appear to be practicable are now equipped with them, and with excellent results. In cases where standard units are not applicable it is often practicable to develop one that is. When a counting device is desired for some particular purpose the best way to get the most satisfactory results at minimum expense is to consult with one of the reliable manufacturers who has had a wide experience in this field.

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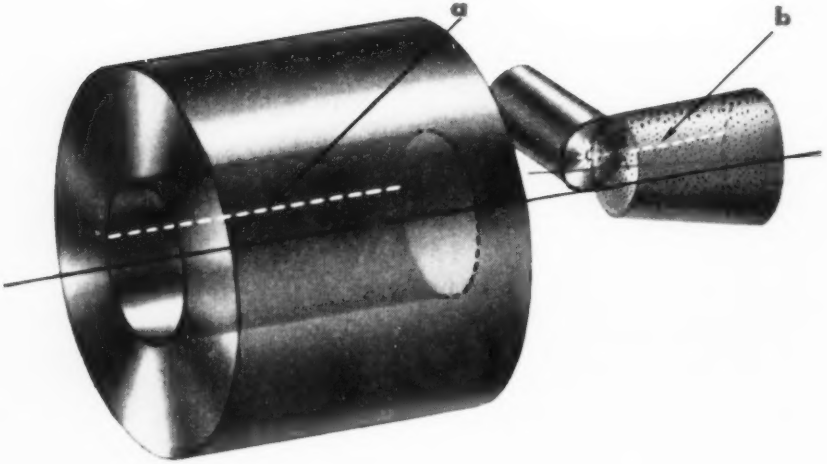
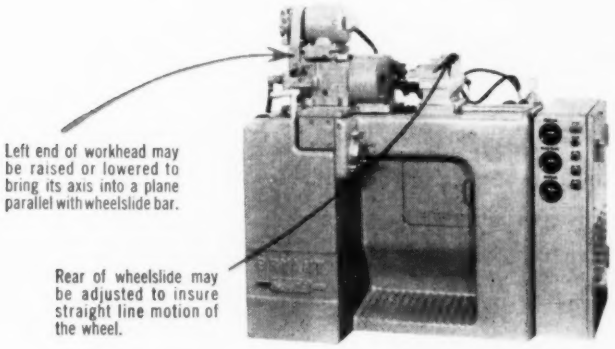


GRINDING a straight hole on an internal grinder is normally done with a straight (cylindrical) wheel. It is sometimes desirable to turn the wheelhead and dress the wheel to a taper in order to use a more rigid projection. However, this setup presents some serious obstacles which cannot be overcome unless they are clearly understood. In order to grind a straight hole the various elements of the machine must be in perfect alignment. The degree of alignment will be determined by the accuracy required on the finished part. A machine may be lined up sufficiently to produce holes within tolerance when grinding with a straight wheel, but if the wheel is turned and dressed to a taper, the alignment problem is magnified to such an extent that it may be impossible to produce holes within the same tolerance.

The center lines of the wheel, work and diamond must be in a common plane so that the wheel contacts the work at line "a". If the tapered wheel contacts the work above or below line "a" the wheel will touch only at its

largest diameter and, as the wheel reverses (at the left end of the hole), it will transfer its taper to the work resulting in a tight hole at the back. Turning the workhead or changing the length of traverse cannot overcome this error. Further, because of poor contact, wheel wear will be excessive and finish poor.

If the diamond is set either above or below line "b" (which is a continuation of "a") the wheel will be dressed to a curve (hyperbola) and even if the wheel contacts the work at line "a" it will be only a point contact. Again, the wheel form will be transferred to the work at the point of reversal, wheel wear will be excessive and finish poor. The proper setup calls for the work axis, wheel axis and diamond to be in a plane parallel to the longitudinal and cross motion of the machine.


Left end of workhead may be raised or lowered to bring its axis into a plane parallel with wheelslide bar.
Rear of wheelslide may be adjusted to insure straight line motion of the wheel.

The Bryant 1109 Precision Internal Grinder is a semiautomatic machine, designed especially for grinding small bores. Although intended primarily for bore diameters of less than 1", it has a chuck swing of 9" and a maximum grinding stroke of $3\frac{1}{2}$". By using preloaded bar slides for both cross and longitudinal slide movements, sensitivity is obtained without loss of rigidity. These rigid slides transmit the operating load directly to the base of the machine. The Bryant Hi-Frequency Wheelhead, providing speeds up to 100,000 R.P.M., is furnished as standard equipment to assure efficient surface speeds on the wheels necessary for griding small bores. Write for further information.

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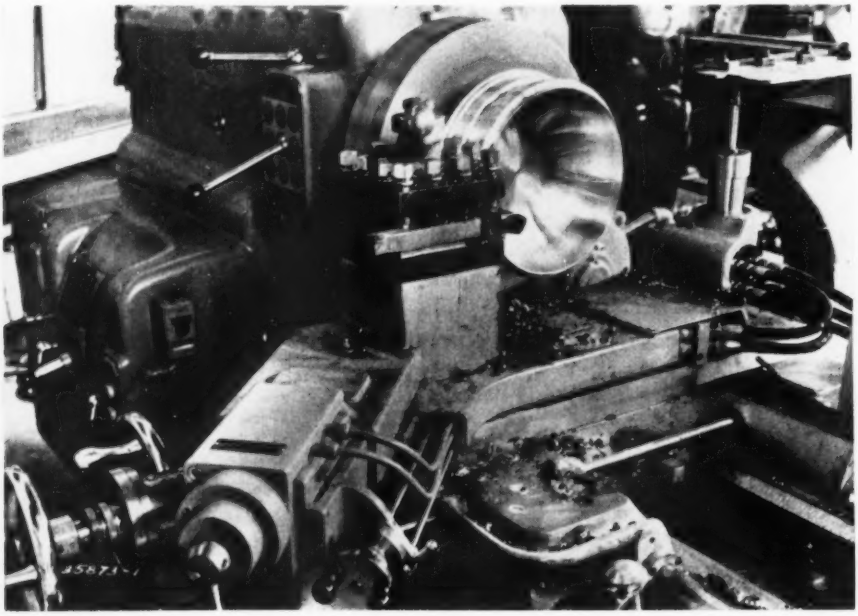
MODERN TOOLS in ACTION

Machine Difficult Contours for Guided Missiles with Turchan Followers

MACHINING OF difficult contours for guided missile parts at Rheem Mfg. Co., Downey, Calif., is simplified by equipping standard lathes with Turchan followers, requiring only 68 minutes to complete the part, as compared to con-

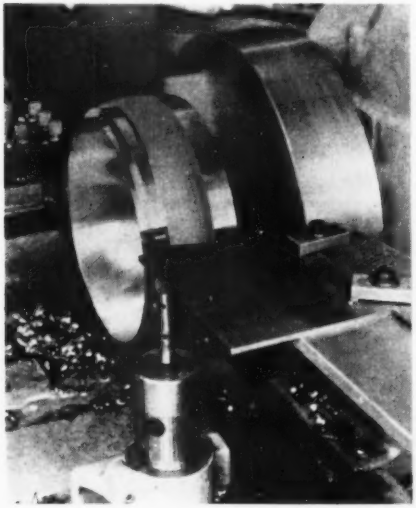


ventional method of 3 hours.

In turning the inside and outside diameters of these air tank heads, 23 lbs. of stock at 12" dia. must be removed from rough forgings of 4130 aircraft steel. This is accomplished with +.005 / —.000 tolerances.

A full spherical radius had to be cut inside. The contour starts straight blends into 2¾" radius and blends again into 8" spherical radius. By ordinary methods this seemed almost impossible, but the problem was easily solved with installation of Turchan hydraulic duplicators.

A stylus point follows the template to guide the tool by power cross feed, reproducing the exact contour on the



part. **The ease of setup and simplicity** of tooling with this attachment provided many advantages, including use of conventional tools which produce a better, smoother surface finish than can be obtained with costly form tools. The finish tool for making the final cut requires no adjustment for size from rough to finish as tools are set in proper relation. Facing to length, inside bore and radius to centerline are all controlled by the template and first size setting when setup is made. Calipering is confined to first diameter only, with subsequent diameters obtained automatically. The duplicating attachment, as manufactured by Turchan Follower Machine Co., 8259 Livernois, Detroit 4, Mich., will meet any combination of the lathe's feeds, speeds and tooling.

Burnishing adopted for finishing axle journals

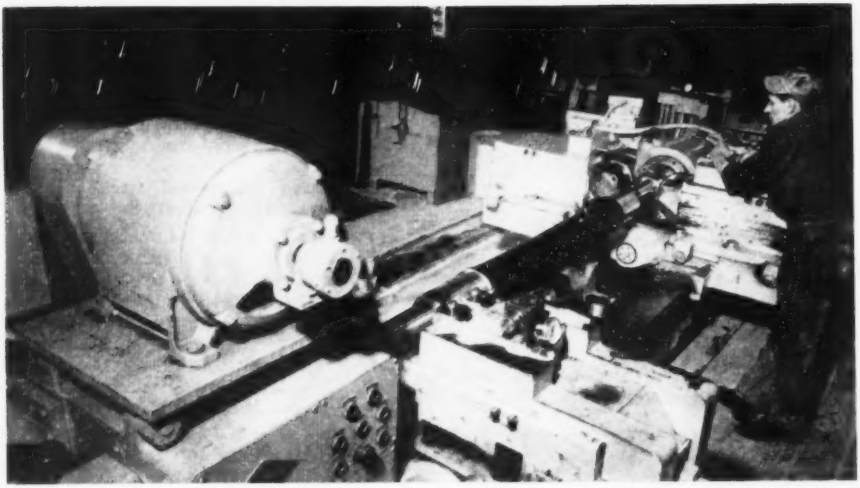
Automatic machine burnishing was adopted recently for finishing car wheel axle journals in the Glenwood shops of the Baltimore and Ohio railroad in Pittsburgh. For this purpose a heavy-duty end-drive hydraulic operated burnishing lathe of new design was installed. The lathe is a development of Baldwin-Lima-Hamilton Corp., Hamilton, Ohio.

Burnishing, formerly a manual operation on axle turning lathes, is now done as an almost completely mechanized operation. Predetermined pressure is applied hydraulically and automatically held constant on the burnishing wheels while the axle is motor driven at 220 r.p.m. and the selected feed speed is maintained between 1 and 20 in. per minute. Close controls during the burnishing operation result in a uniformity of finish that is believed to be an important factor in further reduction of the number of hot boxes experienced on the road.

Use of the Niles burnishing lathe has cut burnishing time 25% in spite of the fact that it now requires setup on a separate special machine. An operator can burnish both journals of an axle at the same time and finish up to 10 axles per hour. Average output for an 8-hr. shift is 65 axles.

Manual labor is completely eliminated. Hydraulic devices under finger tip control position the axle in the machine, move the headstock driving plate and tailstock center against the ends of the axle with enough hydraulic pressure for the driving plate to turn the axle by means of frictional contact, and press each set of burnishing rolls against the axle at the desired pressure. Variable feed of roll carriage is also hydraulically operated and controlled.

The machine takes axles 5½ to 9 ft.



long with journal diameters 3¾ in. to 9⅞ in.

It has also been found practical to burnish wheel seats on diesel locomotive axles on the Niles burnishing lathe in order to permit taking wheels off and putting them on with loss damage to surfaces. The new machine will be used

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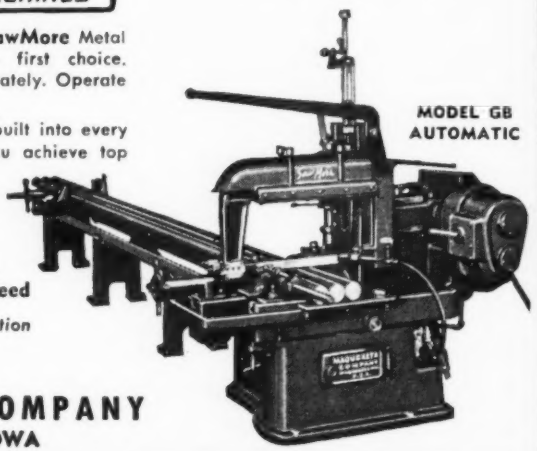

MODEL GB
AUTOMATIC

MAQUOKETA COMPANY
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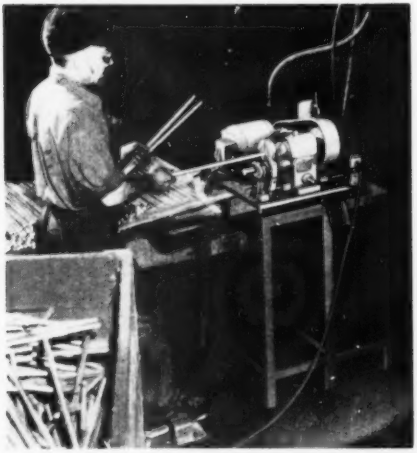
for this purpose to a greater extent as soon as additional machine tools are installed to perform other operations on these axles.

Bench-type end-finishing machine speeds rod pointing

In a large farm equipment plant, it is claimed that a wide range of steel rod pointing work is currently being handled 40% faster than by previous methods on a new bench-type end-finishing machine. On the job illustrated, previously handled on a threading lathe, direct labor costs per 100 pieces have been reduced from 51 cents to 23 cents. The piece is a ⅝" diameter, C-1010 steel rod.

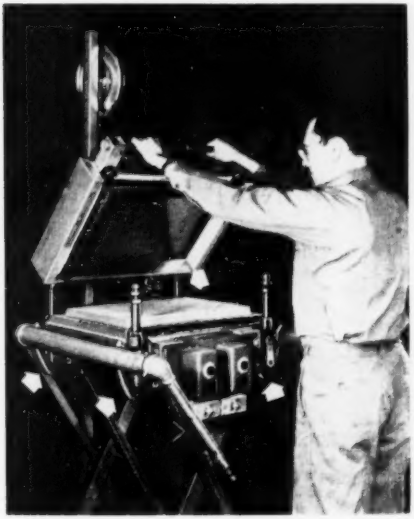
Built by Pines Eng. Co., Inc., Aurora, Ill., the machine is equipped with a foot-controlled air cylinder. The operator depresses an electrical foot control which starts an automatic clamp and feed cycle. The work is fed to rotating cutters which are held in the main spindle behind the chuck jaws. When the pointing operation is completed, the chuck automatically returns the workpiece and unclamps. The operator's hands are free at all times for faster stock handling and loading. Multiple cutters reduce the machining cycle. In addition, an automatic swing-type stock stop enables fast positioning of the work in the open chuck jaws. An adjustable stop screw controls the forward travel and depth-of-cut.



For short run work, standard model Pines No. 600 end-finishing machines without the air cylinder attachment are also provided. On these units, a manually-operated lever is used. Like the air-operated unit, a single forward movement of the rack gear clamps and feeds the piece to the cutters. With either model, it is possible to ream, bore, and face tube and pipe ends, center-drill bar stock, and chamfer or form rod ends. In addition, positive clamping of the work permits such operations as deburring, chamfering, and facing to be completed separately or simultaneously, resulting in improved part finish and simplifying subsequent machining, fitting, or assembly work.

Toggle clamps provide pressure for plastic mold

Development of a plastic mold designed around De-Sta-Co toggle clamps is announced by Palmer Plastics, Inc., Detroit, Mich. George Bruce Palmer, president of the company and designer of the unique mold, described it as efficient and practical for production



purposes. The custom mold is producing ventilator doors for Fruehauf insulated trucks and semi-trailers. The light weight plastic fiber glass doors permit nearly 50 per cent weight savings.

Four Model Number 650 De-Sta-Co plunger type clamps, made by the Detroit Stamping Co., 347 Midland Ave., Detroit 3, Mich., provide the necessary pressure to mold the fiber glass laminated insulation for the ventilator doors. The clamps are attached to the upper mold by a locking lug with adjusting thread screws. Linking extension handles, which permit leverage to open and close the mold, are attached with arms which ride in a channel to synchronize the action of the four clamps. The upper half of the mold is counterbalanced to aid opening and closing.

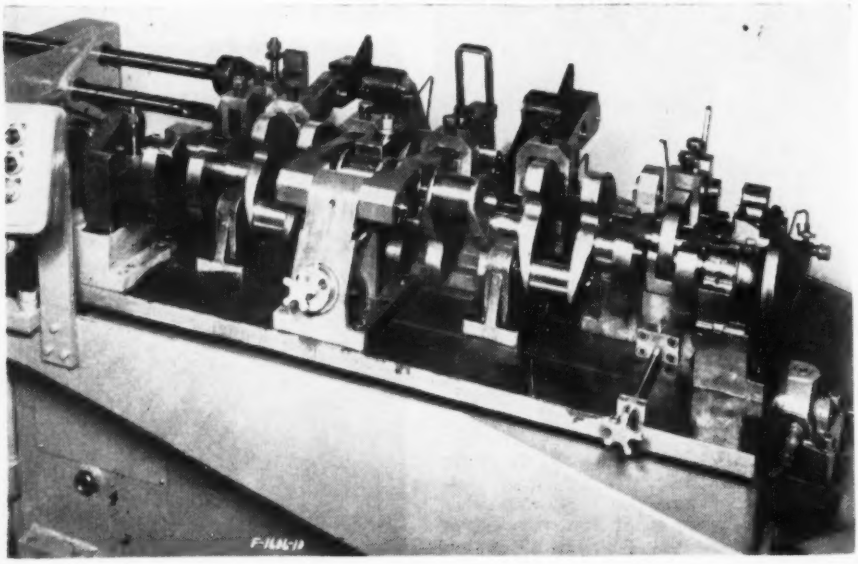
In the manufacturing of the door panels, the fiber glass insulation is cut to size, sprayed with a bonding agent and covered with a fiber glass mat which makes up the pre-form. The pre-form is sprayed with an additional bonding plastic and placed in the mold which is electrically heated and controlled by thermostats. After cooling, a double weatherseal plastic gasket and hardware are mounted on the panel and the ventilator door is completed. The plastic laminated seamless shell of the door panel is the same material used for military flak and shrapnel body armor.

Drill, ream lightening holes in six crank throws

Three drilled and reamed crankshafts per hour is the production of this LeMaire horizontal one-way six-spindle drilling and reaming machine with two work holding fixtures.

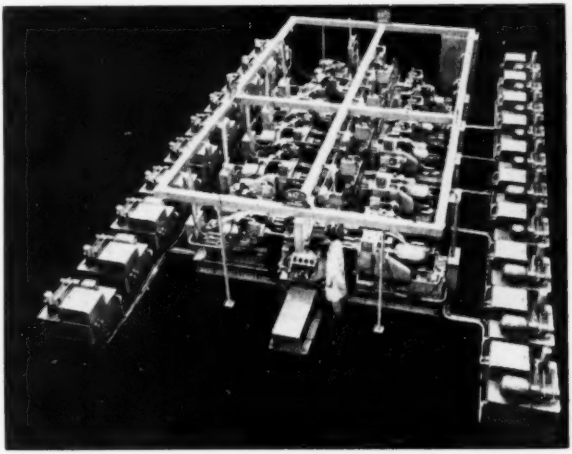
The machine consists of a LeMaire No. 20 ½.s. hydraulic feed unit having 60" of feed with 6-spindle head, fabricated steel fixture base and two work holding fixtures. A tool support mounted on the ways moves with the head and supports the tools between the head and the drill guide bushings.

Because of the size of the holes (1-5/8") which were drilled from the solid in very tough steel, drills were



of unequal length and load was divided by first drilling thru No. 1 and No. 2 crank throws with No. 1 and No. 2 spindles, then thru No. 3 crank throw with No. 3 spindle, thru No. 4 and No. 5 crank throws with No. 2 and No. 3 spindles, and finally thru No. 6 crank throw with No. 1 spindle. After drilling, crankshaft was transferred to reaming fixture and reaming operations were handled with three spindles in the same manner as drilling. Two parts are operated on at the same time, one being drilled and one being reamed.

102 Operations in 6/10 of a second on engine blocks

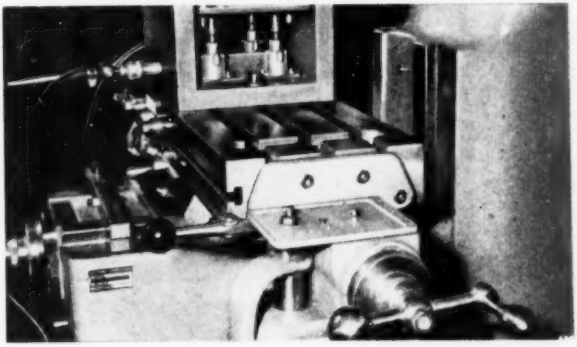


This new Natco Holeway automatic processing machine, manufactured by the National Automatic Tool Co., Inc., Richmond, Ind., incorporates Natco mobile hydraulic power units.

These new Natco mobile power units are said to comply with J. I. C. standards and make possible the highest continuity of production. Units shown provide fast replacement to keep down time to a minimum. They provide quick accessibility for adjustment or repair and lower maintenance cost.

Production on this Holeway is approximately 100 parts per hour. It completes 102 operations automatically on each engine block in 6/10 of a minute including drilling, combination core drilling and counterboring, chamfering combination ream and chamfer, and combination ream and counterbore, repan and also ream.

Air cylinders in milling operation



This picture shows the locating of the gear box in a milling fixture. The gear box is held in proper position by four Mead V-1 Midget air cylinders manufactured by Mead Specialties Co., Dept. AMS6, 4114 N. Knox Ave., Chicago 41, Ill., during a spot facing operation on this die cast gear box. Thus far, quite a large number of parts have been run and the fixture is working in an excellent manner.

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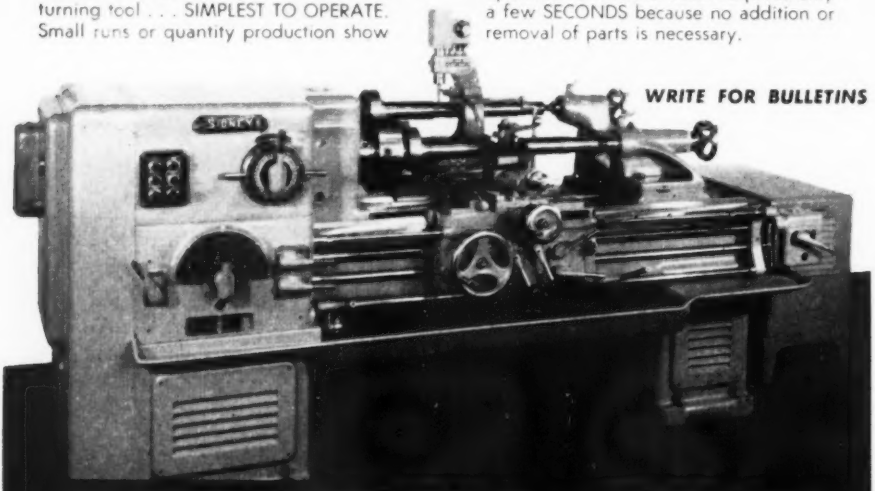

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Foremanship Forum

What Method Do You Use To Figure Overtime?

by **Robley D. Stevens,** LL.B., J.D., LL.D.
Management Consultant

THE RECORDING of labor costs in a machine and tool shop is one of the most important parts of management. It is natural for the management to think of its total operation in terms of individual tasks. This involves both the cost accumulations and the financial arrangement of the labor involved.

Payroll methods for machine and tool shops should provide a means for the simple determination of amounts paid employees each week or other pay periods, the accumulation of information to be used in the compilation thereof for inspection of the wage-hour inspector, in order to preclude overpayments and/or underpayments.

The puzzle gets tougher if management does not have a payroll method that meets with official approval under the Fair Labor Standards Amendments.

Employees in a machine and tool shop cannot work in excess of 40 hours a week unless: (a) they are specifically exempted as an executive or administrative worker as provided in Section 13 (a), or (b) unless they are paid time and a half their "regular rate" of pay for all hours in excess thereof as provided by Section 7.

In addition, if an employee's regular rate of pay is higher than the statutory minimum of 75 cents an hour, his overtime pay for hours in excess of 40 must be figured at a rate of time and one-half such higher rate.

When this writer was a law-enforcement agent of the Wage-Hour and Public Contracts Divisions, United States Department of Labor, he visited several machine and tool shops, and naturally pursuant to his official duties he was alert to the manner in which overtime pay was computed. He dis-

covered with surprise how little some foremen knew about the figuring of overtime pay. In some instances, some foremen did not know it thoroughly or at least failed to furnish adequate data. One was relatively disinterested, and one was well prepared to figure overtime pay because his employer taught him how.

This situation is not confined to one machine and tool shop, but in my management consulting work, I find it may be observed in many establishments.

Many foremen are unwittingly adding sizeable amounts to the overtime bills of machine and tool shops if they fail to take advantage of the following official methods of computing overtime pay.

How do your foremen look at this figuring of overtime? Do they look at it as a difficult, unrewarding drudgery? As a necessary or unnecessary evil? If their answers are "yes" to any of these questions, then they should be entitled to some help on the subject for obvious reasons.

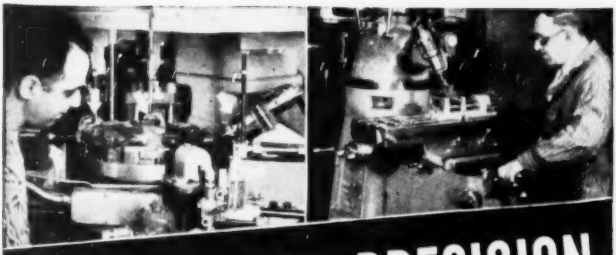
If the management of your machine and tool shop is paying too little or too much overtime pay after 40 hours a week to its employees, then let's examine some the logical steps in computing it. However, it should be observed that the Federal Wage-Hour Law does not require an employer to pay his employee in any specific manner. His earning may be determined on a piece-rate basis, hourly rate basis, salary, or other remunerative basis, but in such cases the overtime pay due the employee must be computed on the basis of the hourly rate derived therefrom as will be seen by the methods advocated by the Wage-Hour Division.

1. **Machine and Tool shop Hourly rate employee:**

   If the employee is employed solely on the basis of a single hourly rate, the hourly rate is his "regular rate." For his overtime work he must be paid, in addition to his straight-time hourly earnings, a sum determined by multiplying one-half the hourly rate by the number of hours worked in excess of 40 in the week. Thus, a $1 hourly rate will bring for the employee who works 46 hours, a total weekly wage of $49 (46 hours @ $1 plus 6 hours @ 50 cents). In other words, the employee is entitled to be paid an amount equal to $1 an hour for 40 hours and $1.50 an hour for the 6 hours of overtime, or a total of $49.

   If, in addition to the earnings at the hourly rate, a production bonus of say, $4.60 is paid, the regular hourly rate of pay is $1.10 an hour (46 hours @ $1 yields $46; the addition of the $4.60 bonus makes a total of $50.60; this total divided by the 46 hours yields a rate of $1.10). The employee is then entitled to be paid a total wage of $53.90 for 46 hours (46 hours @ $1.10 plus 6 hours @ 55 cents, or 40 hours @ $1.10 plus 6 hours @ $1.65).

"Does that answer your question?"



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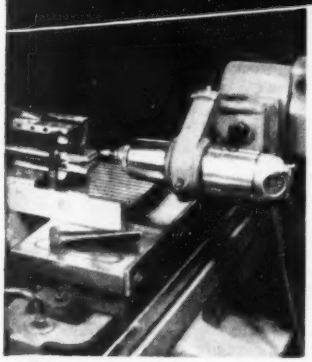

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2. **Machine and Tool Shop Piece Rate Workers:**
When an employee is employed on a piece-rate basis, his regular hourly rate of pay is figured by adding together his total weekly earnings from piece-rates and all other sources (such as production bonuses) and any sums paid for waiting time or other hours worked (except statutory exclusions). This sum is then divided by the number of hours worked in the week for which such compensation was paid to yield the pieceworker's "regular rate" for that week. For his overtime work, the piece-worker is entitled to be paid, in addition to his weekly earnings, a sum equivalent to one-half this regular rate of pay multiplied by the number of hours worked in excess of 40 in the week. Only additional

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half-time pay is required in such cases since the employee has already received straight-time at piece rates for all hours worked. Thus, if the employee has earned $46 at piece rates for 46 hours of productive work and in addition has been compensated at 75 cents an hour for 4 hours of waiting time, his total compensation—49—must be divided by his total hours of work—50—to arrive at this regular rate of pay—98 cents. For the 10 hours of overtime the employee is entitled to additional compensation of $4.90 (10 hours @ 49¢). For the week's work he is then entitled to a total of $53.90 which is equivalent to 40 hours @ 98 cents plus 10 hours of overtime @ $1.47).

In some cases, an employee is hired on a piece-rate basis coupled with a minimum hourly guaranty. Where the total piece-rate earnings for the

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week fall short of the amount that would be earned for the total hours at the guaranteed rate, the employee is paid the difference. In such weeks the employee is, in fact, paid at an hourly rate and the minimum hourly guaranty which he was paid is his regular rate in that week. In the example, just given, if the employee was guaranteed $1.10 an hour for productive work, he would receive $50.60 (46 x $1.10) for the 46 hours of productive work (instead of the $46 earned at piece rates). In a week in which no waiting time was involved, he would be owed an additional 55 cents (half-time) for each of the 6 overtime hours worked, to bring his total compensation up to $53.90 (46 hours @ $1.10 plus 6 hours @ $1.65). If he is paid at a different rate for waiting time, his regular rate is the weighed average of the two hourly rates.

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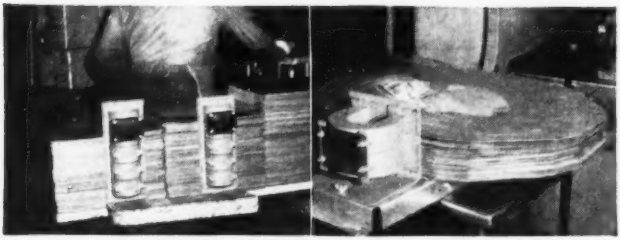

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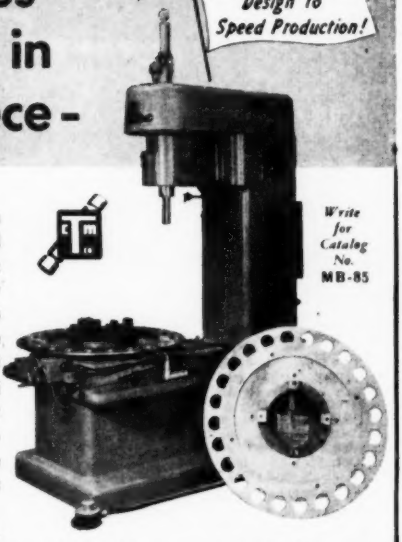
3. **Machine and Tool Shop Day and Job Rates employees:**
   If the employee is paid a flat sum for a day's work or for doing a particular job, without regard to the number of hours worked in the day or at the job, and if he receives no other form of compensation for services, his regular rate is determined by totaling all the sums received at such day rates or job rates in the workweek and dividing by the total hours actually working. He is then entitled to half-time pay at this rate for all hours worked in excess of 40 in the workweek.
4. **Machine and Tool Shop Salaried Employees—General:**
   If the employee is employed solely on a weekly salary basis, his regular hourly rate of pay, on which time and a half must be paid, is computed by dividing the salary by the number of hours worked which the salary

78 Holes tapped in one piece -

Another Cleveland Design to Speed Production!



This Model E-2 with special column and special hand index table was designed by Cleveland to cut costs on a large jet engine part. 63 holes .250-28 and .375-24 are tapped on one side and 12 holes .375-24 and 3 holes .750-16 on the reverse side. 5 different bolt circles are used.

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is intended to compensate. If an employee is hired at a salary of $40 and if it is understood that this salary is compensation for a regular workweek of 35 hours, the employee's regular rate of pay is $40 divided by 35 hours, or $1.14 an hour, and when he works overtime he is entitled to receive $1.14 for each of the first 40 hours and $1.71 (one and one-half times $1.14) for each hour thereafter. If an employee is hired at a salary of $40 for a 40-hour week, his regular rate is $1 an hour. If his salary is $40 for a 44-hour week, his regular rate is 91 cents an hour. Where the salary covers a period longer than a workweek, such as a month, it must be reduced to its workweek equivalent. A monthly salary is subject to translation to its equivalent weekly wage by multiplying by 12 (number of months) and dividing by 52 (number of

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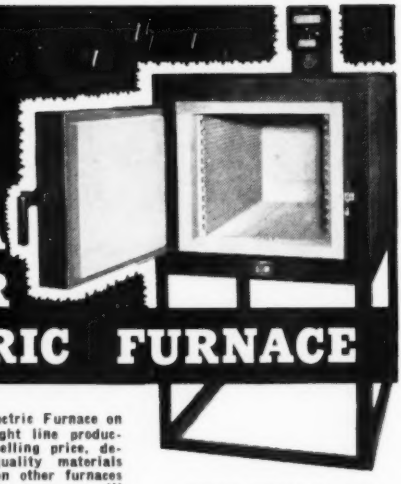

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weeks). A semi-monthly salary of also translated into an equivalent weekly wage by multiplying by 24 and dividing by 52. Once the weekly wage is arrived at, the regular hourly rate of pay will be calculated as indicated above.

5. **Machine and Tool Shop Salaried Employees—Irregular Hours:** If an employee earns $46 per week with the understanding that the salary is to cover all the hours worked and if his hours of work fluctuate from week to week, his regular rate of pay will vary from week to week. Suppose that during the course of 4 weeks the employee works 40, 46, 50, and 41 hours. His regular hourly rate of pay in each of these weeks is approximately $1.15, $1.00, .92 cents, and $1.12 respectively. Since the employee has already received straight-time compensation on a salary basis for all

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Table, 42" x 12"
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hours worked, only additional half-time pay is due. For the first week the employee is entitled to be paid $46; for the second week, $49 ($46 plus 6 hours @ 50 cents or 40 hours @ $1.00 plus six hours @ $1.50); for the third week, $50.60 ($46 plus 10 hours @ 46 cents or 40 hours @ 92 cents plus 10 hours @ $1.38); for the fourth week, approximately $46.56 ($46 plus 1 hour @ 56 cents or 40 hours @ $1.12 plus one hour @ $1.68).

6. **Machine and Tool Shop Employees working at Two Rates:** Where an employee in a single workweek works at two or more different types of work for which different basic hourly rates (of not less than 75 cents) have been established, his regular rate for that week is the weighed average of such rates.

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That is, his total earnings (exclusive of statutory exceptions) from all such rates are divided by the total number of hours worked at all the jobs.

Some foremen have told me that they are stumped at understanding the so-called Statutory exclusions. Well, Section 7(d) provides: "As used in this section the "regular rate" at which an employee is employed shall be deemed to include all remuneration for employment paid to, or on behalf of, the employee, but shall not be deemed to include the following."

1. Sums paid as gifts, as a reward for service, the amounts of which are not measured by or dependent on hours worked, production, or efficiency;
2. Payments made when no work is performed due to vacation, holiday, illness, failure of the employer to

provide sufficient work; travel expenses;

3. Sums paid in recognition of service performed if either (a) the fact that payment is made and the amount is determined at the sole discretion of an employer, and not pursuant to any prior contract, agreement, or promise causing the employee to expect such payments; or (b) payments made pursuant to a bona fide profit-sharing plan or trust meeting the requirements of the Administrator; or (c) payments are talent fees;
4. Contributions irrevocably made by the employer to a trust or third person pursuant to a bona fide plan providing for old-age, retirement, life, accident, or health insurance or similar benefits for employees;
5. Contributions provided by a premium rate paid for certain hours worked by the employee in any day or workweek because such hours are hours worked in excess of 8 in a day or 40 in a week or in excess of the employee's normal working hours or regular work hours, as the case may be;
6. Extra compensation provided by a premium rate paid for work to the employee on Saturdays, Sundays, or holidays and regular days of rest, or on the sixth or seventh days, where such premium rates are not less than one and one-half times the rates established in good-faith; and
7. Extra compensation provided by a premium rate paid in pursuance of an applicable employment contract or collective bargaining agreement.

Since wage-hour inspectors check all sorts of systems and methods in figuring overtime pay, the foregoing guide may be helpful in precluding possible costly penalties and eliminating underpayments and overpayments.

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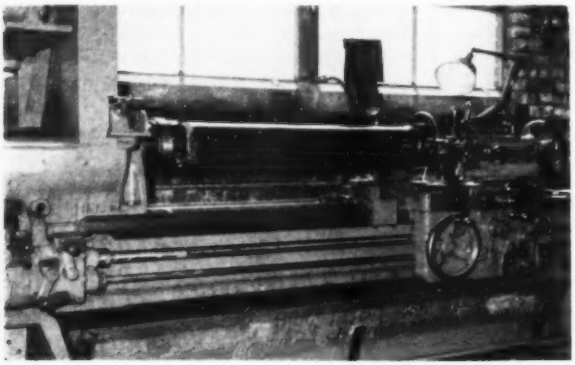
Shop HINTS

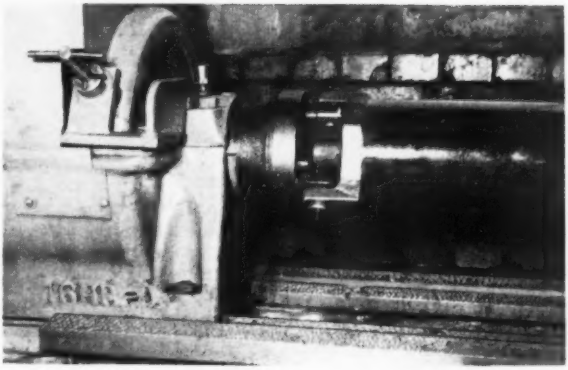
Internal Gripping Eliminates Steady Rest

by **H. G. Frommer**

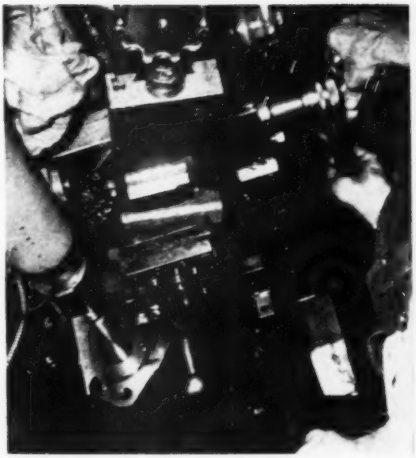
TO COUNTERBORE and face a cylinder made of steel tubing with a welded flange that was bored and honed on previous operations and to keep the counterbore well concentric with the inside diameter, the tubing was provided with a short turned surface on



1. Tube in cutting position on engine lathe. Splash cover in background is in open position.



2. Hinging arrangement permits loading and unloading of the long tubes. Note locking device at left: Spring loaded detent locks against lathe gear to prevent fixture from rotating during loading and unloading.

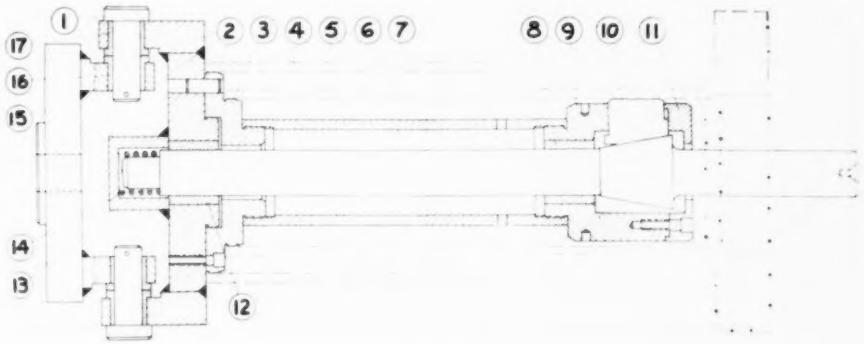


3. Tools are fastened in a small square turret on top of cross slide compound. Upright clip over tailstock positions coolant hose.

4. Fixture swings away from lathe bed for loading and unloading. Note the three jaws, the jaw cage cover and clamping shaft inside of tube. Jaws grip tightly without damaging honed finish.

the outside for use with a steady-rest. However, this outside turning operation, as well as the use of a steady-rest, proved to be expensive, cumbersome and unnecessary, as it contributed nothing to the value of the product.

To eliminate this operation we devised an internal chucking fixture to work in conjunction with a simple engine lathe. Plate (15), provided with two accurately machined lugs, is fastened to the lathe face plate. The lugs, fitted with hardened bushings (17) are matched with two other lugs which are part of the fixture body (2). Two pins (1) serve as hinges for the fixture body. Pilot plate (3), made for two sizes of work pieces (4 and 5), is fastened to the fixture body. Fastened to the pilot plate is a pipe spacer (6) that serves to hold the jaw cage (9). This jaw cage, fitted with bushing (8), holds three hardened and ground jaws (10). Jaw cage cover (11) confines the jaws longitudinally.

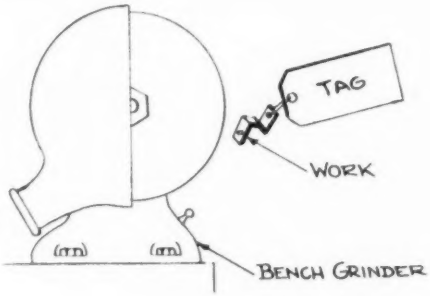


Clamping shaft (7), that pilots within the fixture body bushing (12) and jaw cage bushing (8), is provided with a taper that matches tapers on the insides of the three jaws. The clamping shaft is also provided with a center hole into which the center of the tail stock fits. When the tail stock spindle is advanced by the operator, the taper of the clamping shaft exerts outward pressure against the jaws which, in turn, clamp against the inside of the honed tubing. Spring (14) within the spring housing (13) returns the clamping shaft when tail stock pressure is relaxed during the unclamping operation. To load and unload the long tubes it is necessary to swing the fixture body around its hinges. This operation is shown on one of the photographs, figure 4.

As can be seen from the drawing, the jaws and jaw cage cover are sufficiently far inside of the work pieces to permit the counterboring and facing with tools mounted on a square turret on top of the cross slide compound.

Tag that small piece

Often when grinding or wire brushing a very small piece of work the part being ground or wire brushed will get away from the mechanic, and cannot



be found; perhaps it is the only one left to complete an order. To make the small part easy to find just tie a tag to it as shown in sketch above.

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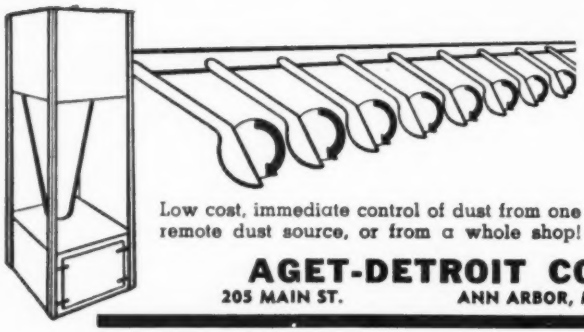

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Plug gage inventory and rework

By **Harold D. Rhodenbaugh**

How much of his profits is the American industrialist tieing up in plug-gages alone? How many combinations of "go" and "no go" gages are there in increments of thousands, in tens of thousands, in one inch?

Far too many to figure out here, but following is a plug gage procedure which, if followed, will somewhat eliminate the danger of overstocking, and will greatly reduce the cost of rework. Futhermore, it will show where it is more economical to use carbide.

The first step is to set up a plug gage record file, figure 1. All "go" plug gage members are listed numerically in one file, and all "no go" members in another. Each card records the history of one member only. The numerals 1 through 12 listed at the left side of the card represent the twelve months of the year. Each time a plug gage is charged out, a duplicate copy of the charge ticket goes to the file clerk who indicates on the card as illustrated, that plug was used five times during the month of January. Under stock are listed the number of plugs in active use. Quantity lists the amount in store.

Figure 2 is the rework or purchase sheet. The plug gage expeditor requests that this sheet be filled out by the clerk from her file (after he

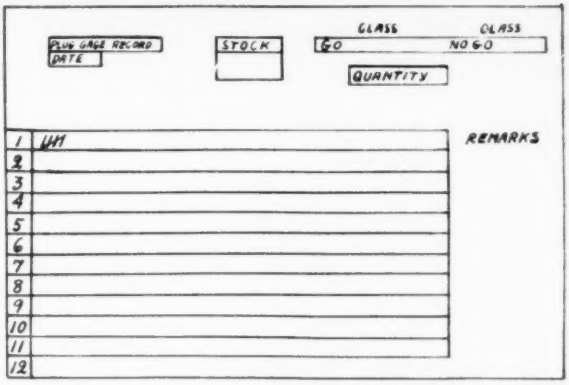


Figure 1

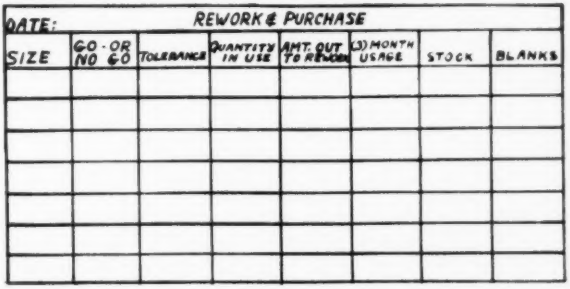


Figure 2

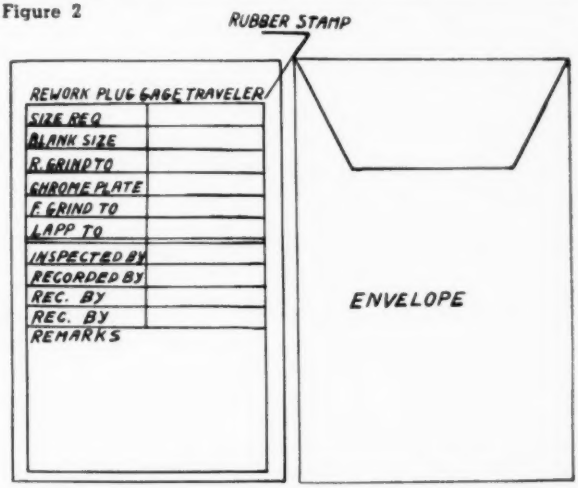


Figure 3

has set down the sizes of his rejects from inspection.) This rework or rejection sheet tells the expeditor of plugs exactly what the plug gage status is at a glance. Under blanks the expeditor lists the quantity of blank sizes available to cover quantities in stores in emergencies.

Figure 3 is a rework plug gage traveler. This can be supplied by any rubber stamp company. Envelopes of sturdy manila paper make ideal containers for plug gage members to be reworked.

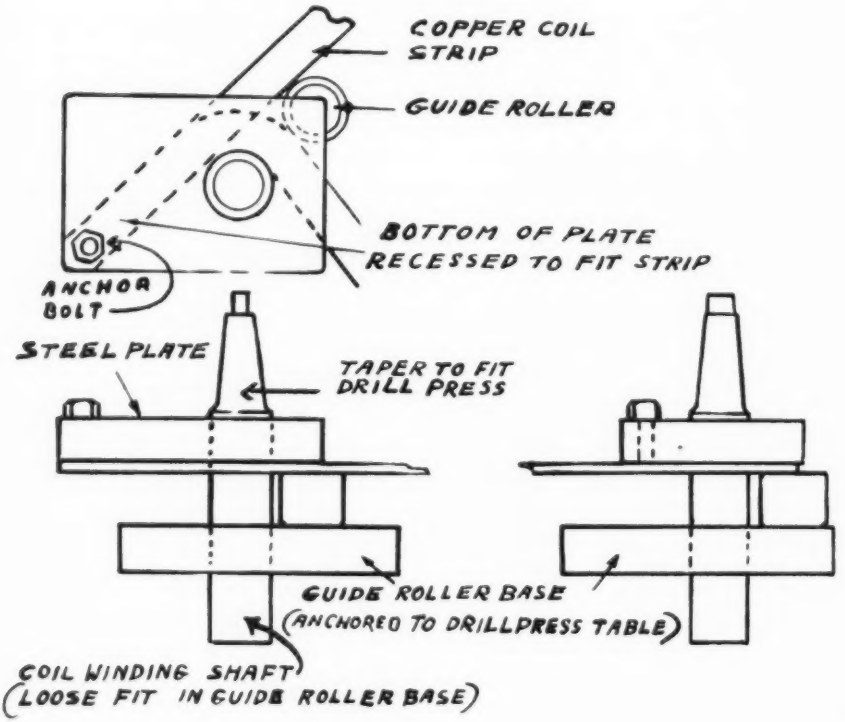
Now, with a plug gage record file, a rework or purchase sheet and a stamped envelope traveler you have absolute control of and a perpetual inventory of your plug gages.

Jig eases winding of coils

A mechanical jig to facilitate winding of edge-wound coils has been devised by Tilford Nordskog, an Allis-Chalmers Mfg. Co. employe.

The jig can be anchored to a drill press or lathe and replaces a stationary fixture in which the rectangular copper stock was fastened and the strip bent around the coil winding shaft. In this process, the worker walked around the fixture to wind the coil.

Now by means of the jig the worker merely guides the strip and stops the press or lathe when the required number of turns has been reached.

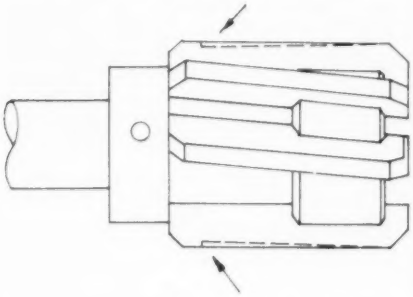


Special grind improves quality of reamed holes

by **John Rogers**

When reaming large holes in steel with adjustable blade reamers, it is often difficult to keep such holes within close tolerances as to diameter, taper and excentricity, especially when the length of these holes exceeds their diameters.

Adjustable blade reamers are shipped by their makers with a standard amount of back taper, at times as high as .007". When the cutting edge of such a reamer leaves the bushing and starts feeding thru a pre-drilled hole, the bushing's



purpose as guide has ceased as it gives no support to the rear portion of the blades because of excessive back taper.

The two-step remedy for such a problem is simply obtained by: (1) reduction of back taper to a bare minimum, as f.i. .001" per inch of blade length; if this still does not result in good holes, by (2) use of the extreme rear section of the blades as a follower pilot. This is done by "circle-grinding" the blades first straight and then again with a slight back taper. However, the back taper should stop about ¼" from the rear end of the blades. If done properly, the rear quarter-inch will have the same diameter as the extreme front or cutting edge and it will not only pilot well within the bushing, but equally well within the work piece if the hole is longer than the reamer blades. The drawing shown here is an exaggerated view of the taper grind with rear pilot. (Reamer blades must be "relieved" same as on any standard grind.)

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MACHINE and TOOL
BLUE BOOK

Report number 32

Grinding Machines . . . part 6

This is the thirty-second in a monthly series of special reports discussing various types of machine tools. Included in this month's special report on grinding machines are:

1. Roll Grinding.
2. Descriptions of late model grinding machines.
3. Specifications of American-built machines.

Previously published reports discussed: 1. Thread Rolling; 2. Power Press Brakes; 3, 4, 5. Milling Machines; 6. Honing, Lapping, and Superfinishing; 7. Automatic Screw Machines; 8. MAPI Replacement Formula; 9, 10. Chucking Machines, Turret Lathes, Hand Screw Machines; 11. Broaching Machines; 12. Shapers, Slotters, Keyseaters; 13, 14, 15. Lathes; 16. Planers; 17. Gear Making Machines; 18, 19. Boring Machines; 20, 21, 22, 23, 24, 25, 26. Drilling Machines; 27, 28, 29, 30, 31. Grinding Machines.

Modern Roll Grinding: Its Peculiarities, Problems and Abrasive Requirements

IN THE field of metal forming probably no other process exceeds the speed of a rolling mill. Whether it concerns flat or bar stock, or a structural shape which lends itself to rolling, the most practical method of producing these shapes rapidly is rolling.

The rapidly expanding facilities for rolling sheet steel have brought the price of this material down to the point where it is replacing wood and com-

By **Peter C. Dooley,**
The Carborundum Company
Niagara Falls, N.Y.

position board in furniture and building construction. This increased acceptance of sheet metal in fields other than the traditional automobile body and tin can has encouraged the steel companies to further expand their facilities and improve their equipment.

In some steel mills today, sheet steel comes off the finishing rolls at a speed of 5000 ft. per minute. This is roughly five times as fast as a paper mill can produce paper.

Keeping step with the tremendous expansion of steel mills is the manufacture of rolls for these mills and consequently the grinding of rolls.

Although steel mill rolls constitute the bulk of roll grinding, they are by no means the only rolls which must be ground. Rolls are used in printing presses, food processing machinery, paper mills, foil mills, brass mills, rubber mills, photographic film, etc.

The problem of manufacturing and grinding rolls to satisfy the needs of all these users would be greatly simplified if they all used the same or similar rolls. However, roll requirements, both dimensional and physical, vary widely from industry to industry and from operation to operation within an industry.

Dimensionally, rolls vary from 1½ in. to 80 in. in diameter and there is one installation in a photographic film manufacturing plant where it is necessary to put a fine ground finish on a roll 18 ft. in diameter. Roll lengths vary from 6 in. to 15 ft.

Physically, rolls may be made of chilled iron, cast steel, forged steel (and alloys), tungsten carbide, rubber, stonite (a composition of rubber and marble chips), brass, copper, chrome plate, etc. In hardness, these materials vary from soft rubber to steels or irons having a shore scleroscope reading of 110.

In considering physical requirements, the matter of surface finish should also be included. Roll finishes generally vary from 50 microinch to 1 microinch or less. An exaggerated case occurred recently where a steel mill desired to obtain a roll with a 150 microinch finish and, strange to say, it was almost as difficult to do this as it is to produce a mirror finish. To obtain the type of finish on sheet steel that some customers require, it is necessary to sand blast the rolls after grinding.

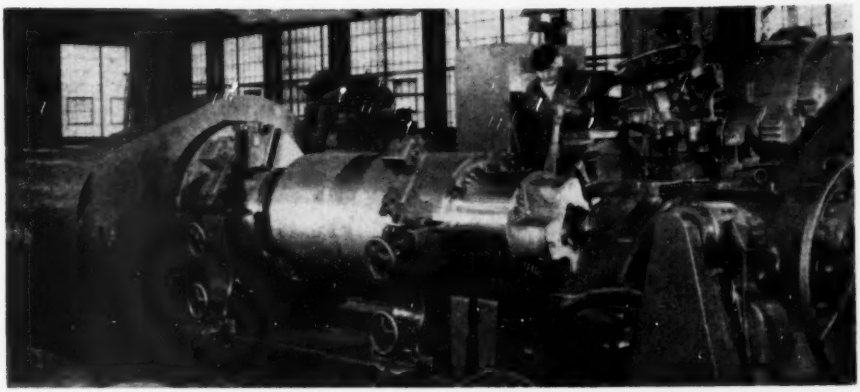
This, briefly, is the scope of modern roll grinding practice.

Let us now consider some abrasive problems which result from efforts to do a satisfactory job of grinding on rolls whose characteristics vary as widely as indicated above.

A logical starting point would be the grinding of rolls from the as-cast state in the plants of prime manufacturers of rolls. Thirty years ago almost all rolls were turned. Roll grinding was a curiosity and done on an experimental basis in an effort to prove or disprove the practicability of grinding. At that time rolls were not as hard as those now in use and turning was feasible; today, however, many rolls are of such hardness as to make grinding mandatory.

Some roll manufacturers divide their roughing operations into two categories. A common division is to rough turn all rolls of hardness less than 78 shore scleroscope and rough grind all rolls harder than this. All rolls are finish ground. It must be borne in mind that in all these discussions of grinding rolls, those rolls used for rolling structural shapes are excluded since they are turned, not ground.

In casting new rolls, iron flasks are employed as molds and reasonable accuracy can be expected. Despite this, a roll 30 in. in diameter may have ¼ in. stock on a side to grind off, figure 1. This much stock must be left to allow for unpredictable shrinkage as the casting cools: (1) to allow for machining



1. Grinding the neck of a new steel mill roll, prior to finish grinding the roll body, on a Landis Tool Co. traveling wheelhead roll grinder.

away any surface imperfections and (2) to allow cleaning up even with imperfect location of centers.

To remove ¼ in. from the radius of a chilled iron roll 30 in. in diameter and 10 ft. long is a sizable grinding job consuming many hours and a considerable quantity of abrasive. In this particular case the actual stock removal is approximately 2,805 cu. in., or 1.6 cubic feet of metal.

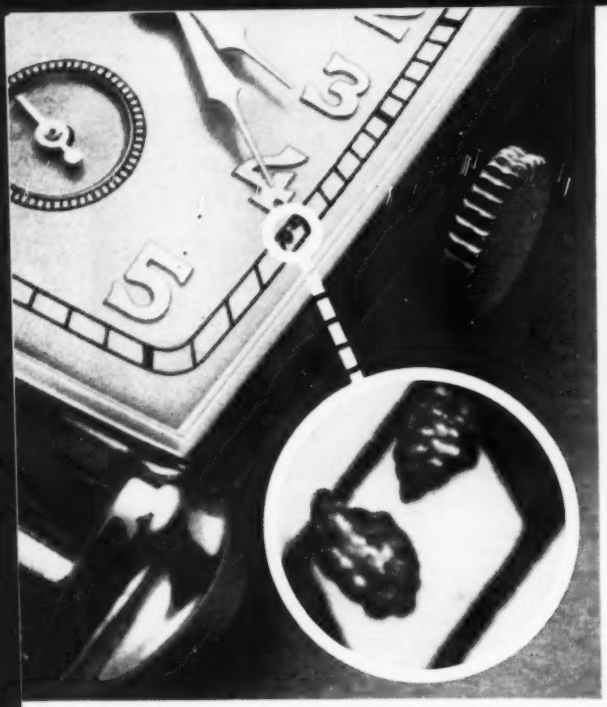
Assuming a grinding ratio of 7:1, 400 cu. in. of abrasive would be consumed. With a single-wheel setup this operation would take about 10-12 hours of continuous grinding. The total cost including labor, burden and abrasive would be approximately $100 for this roughing operation alone. One manufacturer has been performing this operation for several years with a heavy duty machine equipped with three wheels on a single spindle and has cut his roughing time to about 1/3 that used in the illustration.

Abrasive gradings used in this operation vary widely. In the first case mentioned, a wheel in the grading RC24-P7-B8 was used and in the multiple wheel setup, DA60-N6-V11 was used. The wide discrepancy in wheel gradings used on the same operation in different plants is partly the result of personal preference and partly the result of machine characteristics.

Machine characteristics often dictate whether resinoid or vitrified bond types will be used. Many machines do not have sufficiently high operating speeds on the wheel spindle to make good use of resinoid bond wheels, especially when the wheels become smaller in diameter. In these cases, unless severe shock conditions are present, vitrified bonded wheels can be and are often used. Economics also enter this picture since the vitrified wheels cost substantially less than resinoid.

Rolls which have been roughed out in this manner are then transferred to another grinder, figure 2, for finish grinding. The finishing machine is never used for heavy roughing, in order to preserve its accuracy.

In addition to body grinding on new rolls, the necks and adjacent shoulders must also be ground. Neck grinding follows turning in all cases since all roll necks are relatively soft. A generous radius or fillet is formed at the



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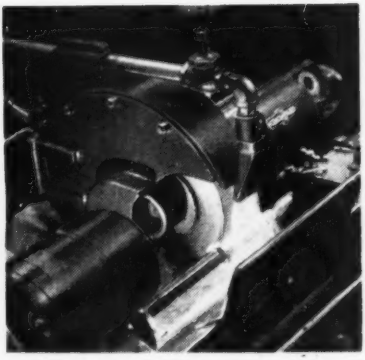
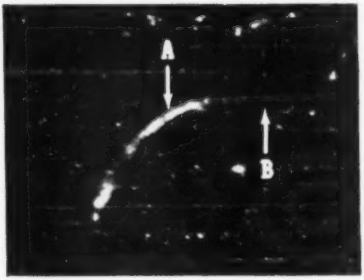
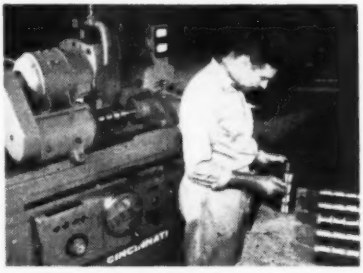


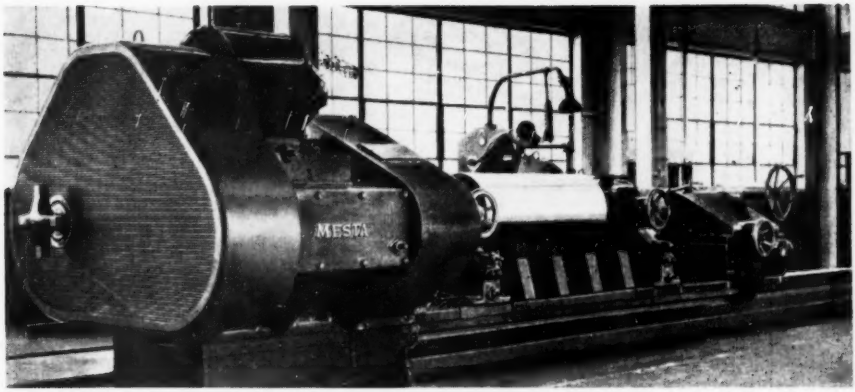
RESEARCH GRINDING problems have ranged from the grinding of surgical sutures .004" in diameter to steel mill rolls 60" in diameter.



GROUND SURFACE OF SAE 3145 steel showing partially formed chip (A) and groove (B) in workpiece from which material of chip was removed.



SPECIAL WORKPIECES shown in picture above, are used by machinist of the research department to compare wheel performance on a centertype grinder.



2. Finish grinding large cold reduction steel-mill work rolls on a Mesta Machine Co. heavy duty roll grinder.

junction of the neck and the body, as illustrated in figure 1, and this must be ground with a form wheel. To further smooth and blend in the neck with the body, a setup wheel is sometimes used in a portable grinder and held offhand.

Roll grinding almost always presents the problem of very large work surface relative to wheel size. The illustration previously used of a roll 30 in. in diameter and 10 ft. long represents a total surface area of 78.5 sq. ft. This operation would be performed with a 36x4x12 wheel and it can be readily seen that, on a surface this large, wheel breakdown on a single pass is excessive. It is therefore common practice to infeed several times in a single pass to maintain the cut and hold work size. This is especially true of a heavy roughing operation such as grinding cast rolls as-cast.

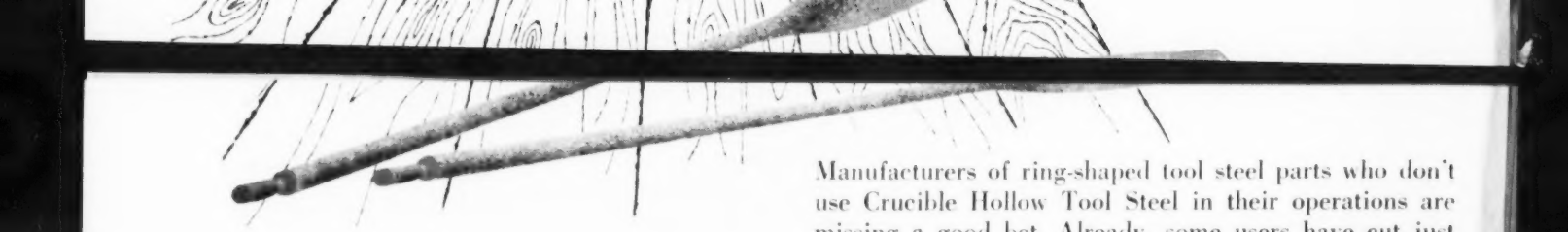
Most machines employed in this work have an ammeter located conveniently for the operator's view and reading the load on the wheel drive motor. As the cut falls off due to wheel breakdown the operator feeds the wheel, guided by the ammeter rather than the graduations on the feed screw. If the ammeter reading is kept constant, the roll will be very nearly straight.

Finish requirements in new roll grinding are not critical since all steel mills regrind before use.

Most steel mills have a great variety of roll finishes to produce. They vary in roughness from rough to fine in this order; blooming mill, breakdown stands in hot mill, roughing and finishing stands in continuous hot mill, roughing and finishing stands in cold reduction mill and temper mill rolls. All of these rolls require different finishes. Different wheels and techniques are employed to produce these finishes.

Wheel grit size varies from 24 on the roughest operation to 800 on the finest. There are a few operations where grit sizes approaching 1000 are used. Both aluminum oxide and silicon carbide abrasive types are used with silicon carbide predominating. Very few vitrified wheels are used in the large steel mills—resinoid and shellac are the popular bond types.

Practice varies from shop to shop and especially from area to area. Some shops use resinoid wheels in relatively hard grades and dress the wheel at frequent intervals. This method is conducive to



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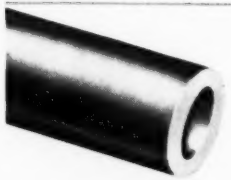

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3. A high quality finish that can be produced in one grinding operation. The view shows lettering on sheet of glass being reflected onto the mirror-like finish on the roll.

long wheel life, but at the sacrifice of fast cut. Other shops use shellac bond wheels in soft grades and never dress the wheel.

The regrinding of blooming mill and hot mill rolls does not involve fine finishes and hence will not be discussed.

Cold reduction mill rolls involve a variety of finishes depending upon which stand they are used and the finish requirements of the strip. For rolling of stock which will be tin plated and eventually used in tin cans, 150-180 grit shellac bond wheels are used and produce a finish of about 15-20 microinch R.M.S. These are intermediate finishes in the range from coarse to fine. Some stainless steel strip must have a mirror-like finish and in these instances a very fine grit silicon carbide or fine grit aluminum oxide of special characteristics must be used.

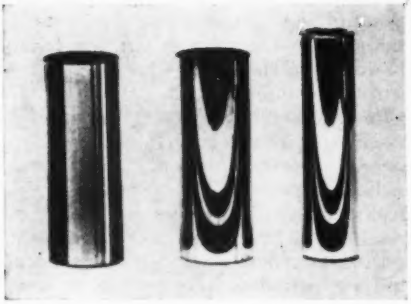
At one Pennsylvania mill the author enjoyed an excellent opportunity to observe individual operator technique in finishing highly finished rolls for stainless steel rolling mills. Two machines are employed in this work: (1) a Cincinnati 24x144 in. traveling table roll grinder with crowning attachment and built-in wheel balancing device, and (2) a Landis 60 in. type 30, also equipped with crowning device.

Plain tap water is used here and is not re-circulated. Wheel AHF-N-BY is used for high finish on the Cincinnati grinding machine and A500 grit shellac bond wheel on the Landis grinding rolls up to 56 in. in diameter.

Figure 3 shows a typical high finish that can be obtained in one grinding operation on rolls which do not contain deep marks as they come from the mill. Until recently it was necessary to employ at least three grinding steps, with successively finer grits, to produce such a high quality finish, see figure 4.

As rolls come from the mill they are in fair condition and do not ordinarily require much stock removal to grind out the defects. In some cases more damage is done to the roll surface in removing the roll from the mill than when rolling strip. Of course, mating rolls must be matched for diameter within .002 in. For this reason it is important that the mating rolls be carefully examined and the roll with the deepest scratches or imperfections be finished first. Otherwise, the first roll might have to be ground twice to match diameters.

Rolling stainless steel is a slow exacting job and roll changes are made quite frequently. Most of these rolls are crowned about .008-.010 in. and this often introduces complications in finishing. The wheel spindle is always parallel to the work axis in this type of machine. Crowning is accomplished by tilting the entire wheel head about a trunnion near the forward end of the carriage. By tilting the wheel head in this way, the wheel is caused to come into the work at the ends of the roll and



4. Three steps in the generation of an ultra-finish on a roll, using successively finer grinding wheel grits.

gradually back away from the work as it approaches the center of the work. In order to keep the crown centered on the roll body the tilting of the wheel head must be synchronized with the work travel.

This construction simplifies the machine design to some extent, but it introduces an element which gives the operator considerable trouble on short rolls. If the wheel spindle is parallel to the work axis at all times as stated above, it is apparent that if the wheel face "fits" the work going up hill (if a rise of .008 in. in 15 in. can be considered a hill), it cannot possibly have the same contact on the work after it passes the center of the roll and starts "down hill."

The author observed this effect at the stainless mill mentioned earlier. On the "up hill" portion of the traverse a good surface, free from any traverse lines, was generated. As the wheel passed the center of the work and started "down hill," traverse lines were immediately generated. Such a condition occurs because the trailing edge of the wheel face is the only portion in contact with the work.

It must be understood that this condition only exists to so marked a degree when the infeed is zero and the wheel is sparking out to raise a finish on the roll. Under such conditions and using a wheel with a 3 in. face, the leading edge will be .0016 in. off the work when it first starts the "down hill" portion of its traverse. As the cut progresses, the trailing edge of the wheel breaks down and by the time the wheel reaches the end of the work it almost "fits" the work surface again and the traverse lines have disappeared.

The damage has been done, however, and finishing will not ordinarily take out these lines.

To compensate for this occurrence, some operators work from both ends to the center on the last passes. Others very skillfully adjust the work neck rests to cant the roll very slightly during the progress of the cut just as the wheel passes the center of the roll. To anyone familiar with ordinary cylindrical grinding, these maneuvers probably seem strange, but in roll grinding it is common practice.

There is another popular method of generating crowned or concave roll surfaces. Cincinnati machines with traveling table sometimes pivot the table on a sub base and control the crown by means of two shoes which are attached to either end of the table and ride on sine bars fixed to the stationary machine base. Such a machine equipped with a sine bar cambering device is illustrated in figure 5. This method has the advantage of always keeping a straight wheel face parallel to the work surface regardless of crown or concavity.

The author has observed operators remove .008 in. stock from a 25 in. diameter by 28 in. wide roll with an AHF-N-BY wheel. This amounts to 7.75 cu. in. of stock—a considerable amount. It has been the practice of many operators to go right from the roughing cuts into the sparkout and finish. The infeed is now zero and the rate of traverse is gradually decreased. Due to the decreased wheel pressure and rate of

traverse the wheel face begins to glaze and polish the work. The greatest skill and judgment are required in machine manipulation to prevent this polishing action from occurring before the work finish is sufficiently good to take a polish without some traverse lines showing from the roughing cuts.

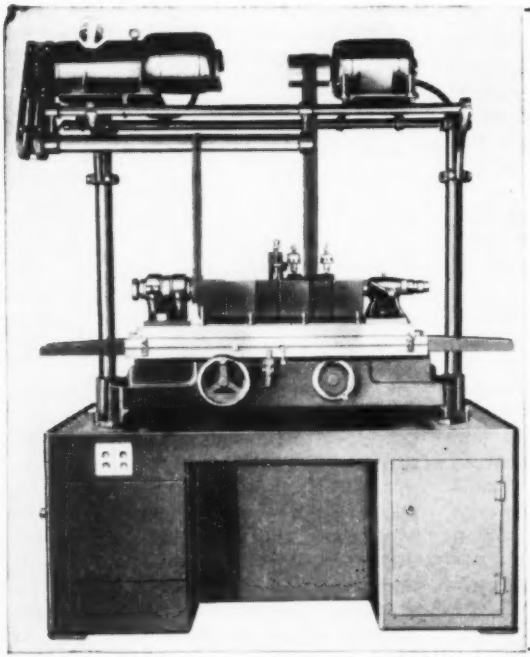
As the wheel face begins to glaze and the work surface is sufficiently refined to take a high finish successfully, a paste bag is applied to the work directly in front of the wheel to further glaze the wheel face. At this point the wheel face actually becomes black. All of this work is done with plain water as coolant and the coolant is not recirculated.

The foregoing text has covered the coarsest and finest finishes encountered in steel mill roll grinding. There are many intermediate finishes, but the technique involved is basically the same.

Before leaving the subject of roll surface finishes and proceeding to a discussion of roll grinding equipment it would be well to mention the unusual method of determining surface finish on rolls and touch briefly upon a recent innovation in roll finishing.

In ordinary cylindrical grinding if a finish specification is indicated it is usually expressed as so many microinches. This can be measured by a profilometer. This type of measurement leaves little room for argument or individual visual appraisal. In steel mill roll grinding the reverse is true. A profilometer is seldom used and roll finishes are determined mostly by eye and mutual agreement between the roll grinding superintendent and the rolling mill superintendent. This results in almost constant discussion and change. Some changes are dictated by customer's finish specification changes, others by individual preferences among the rolling mill supervisory personnel.

Any discussion of roll finishes leads



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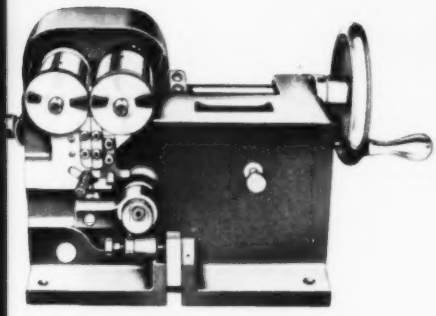

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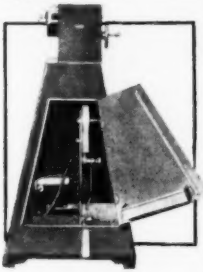

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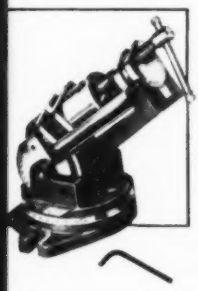

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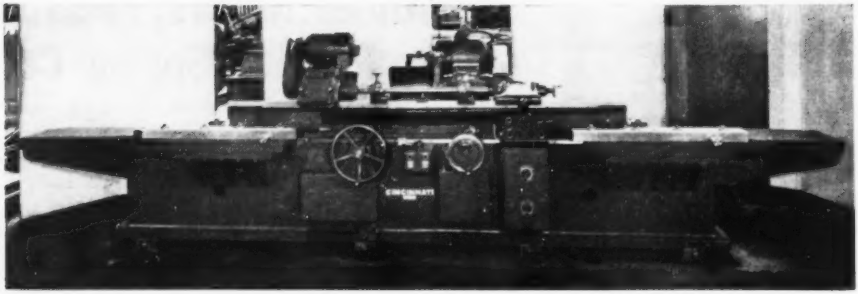

5. A Cincinnati Filmatic 14x72 in. grinder, with sine bar cambering equipment.

naturally into a consideration of the condition of the roll surface. In broad terms the word "finish" may be considered as that property of a surface which can be seen or felt such as color, luster and scratch or grain mark pattern. The word "surface" may be used in describing the physical or metallurgical properties which ordinarily cannot be seen or felt, but which show up when the roll surface breaks down prematurely when subjected to the normal rolling pressures in a mill.

In the early days of roll grinding a good "surface" was produced by using, sometimes, as many as five different wheels each of a finer grit size than the one used previously. This gradual building up of a good surface resulted in a roll of superior surface characteristics. Changing wheels is a time-consuming operation, however, and roll grinders began looking for short cuts. Today few mills use more than two wheels and many use only one.

The question naturally arises, do they produce as good surface as they did by using four and five wheels? Probably not, but most mills operate on the principle that it is cheaper to pull the rolls for regrinding more often and not spend too long regrinding. Naturally it is advantageous to have the rolls stand up as long as possible.

The desire for better surfaces without the prohibitive time factor experienced in earlier methods has recently led to the development jointly by the Gisholt Co. and American Steel & Wire Co. of a large superfinish machine adapted to the finishing of steel mill rolls.

In this process mill rolls are ground to about 15 microinch finish using 180 grit wheels. Next they are placed in the Gisholt superfinisher and this machine, using rigid bonded stones of 500 and 600 grit sizes, takes the work through a fixed cycle of roughing and finishing lasting about 13-15 minutes. The finish which is produced in this machine checks 1 microinch or less. The surface, although not as lustrous as is produced with resinoid wheels, has been found to stand up longer in the rolling mill. Preliminary reports indicate a possible life in the mill of as great as three times that now being experienced.

The equipment used in roll grinding is always interesting and usually different from that employed in ordinary cylindrical grinding. Work size often becomes so great that it is more feasible to traverse the wheel-head than the work. Such a machine is illustrated in figure 6, which shows a 50x216-in. roll grinder under test at Landis Tool Co. The operator travels back and forth with the wheelhead. Almost all

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shops using rolls of any size or quantity have their own roll grinding equipment. Rolls are very expensive so no more are kept on hand in a small mill than are actually needed. This means that rolls pulled from the mill must be reground as quickly as possible. So it can be seen the time element is one good reason for having roll grinding equipment right in the mill. Another reason is the great weight of most rolls, which would make it prohibitive to ship them any great distance for regrinding.

There are some instances in printing plants and wallpaper and chocolate mills where rolls must be reground occasionally but not often enough to justify the expense of roll grinding equipment and a roll grinder operator. Such mills send their rolls out to the nearest shop where equipment is available. In order to lessen the number of times a roll must be shipped out for regrinding, small mills sometimes resort to the use of roll scouring blocks to correct any small imperfections without removing the rolls from the mill.

A roll scouring block is a rectangular block of silicon carbide or aluminum oxide vitrified and approximately 5x4 in. in face dimensions. This block is brought to bear on the roll while the roll is operating at its normal speed in the mill. Extreme care must be exercised to prevent destroying the geometry of the roll, and for this reason roll scouring is limited to the correction of small imperfections only.

In some hot strip mills where pack rolling is still done, roll scouring blocks are set to ride continuously against the roll to prevent slivers of steel from adhering to the roll.

Starting with the smallest roll size, which might be found in a Sendzimir mill, ordinary cylindrical grinders are often used. These rolls, which may be 1½ in. in diameter and 3 ft. long, are sometimes crowned by allowing the pressure of the wheel to bow the work, which is held on centers. This may appear to be a hit-and-miss method, but a skillful operator can obtain consistent results.

If more crown is desired than can be obtained by bowing the work with normal wheel pressure, a hook type steady rest may be employed to spring the work more. Should grinders of the swivel table type with cam bars be available, they should be used in preference to the method of springing the work.

When regular cylindrical grinders are used for this work, vitrified wheels are more commonly employed because the speeds available would not take advantage of resinoid wheels. Occasionally shellac bonded wheels are used on Sendzimir mill rolls, but the danger of scratching is always present.

Coated abrasive belts have been used experimentally to grind rolls, but to date their economy has not approached that of bonded wheels.

Large steel mills usually have a central roll grinding shop to perform regrinding both hot mill and cold mill rolls. It is the usual practice to locate the grinders closest to the cold mill since the rolls used in this mill require most frequent regrinding. It is economical to locate the grinders in such a relation to the rolling mill that the same crane which services the mill can be used to load and unload rolls from the grinder.

Because the hot strip mill is always located some distance from the cold strip mill, rolls are transported by heavy dolly car on rails from the hot strip mill to and from the grinders. Some large mills have moved a large grinder, which has lost its accuracy for high finish grinding, from the cold mill roll shop to the hot mill area thereby reducing the handling on hot mill rolls. This eliminates some wheel changes in the cold mill also since hot mill rolls are usually ground with coarse grit wheels.

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SIZE	THREAD
4	32-48-60-64
5	30-32-36-48-80
6	30-40-48-56-60
7	32-40
8	24-30-36-38-40-44-48
9	24-28-32-40
10	28-30-36-40-48-64
12	20-28-32-36
14	20-24-28
1/16	60-64
5/64	72
3/32	48
7/64	48-56
1/8	32-40
5/32	32-36-40
9/64	36-40
11/64	36
3/16	20-24-32
13/64	32
7/32	24-28-32
1/4	18-24-26-27-30-32-36-40
5/16	16-20-22-27-28-32-40
3/8	12-16-18-20-27-28-32-36-40-48
7/16	12-16-18-22-24-27-28-30-32-36-40
1/2	12-14-16-18-22-24-26-27-28-30-32-40
9/16	16-20-24-27-28-30-32-40-48
5/8	12-14-16-20-24-27-28-32-36-40
11/16	11-16-18-20-24-27-28-30-32
3/4	9-11-12-14-18-20-24-26-27-28-32
13/16	10-14-18-20-32
7/8	10-12-16-18-20-24-27-28-32
15/16	8-9-10-12-14-16-18-20-24-32
1	10-12-16-18-20-24-27-32-40
1-1/16	12-14-16-18-20-24
1-1/8	8-10-14-16-18-20-24-32
1-3/16	8-10-12-14-16-18-20-24
1-1/4	8-10-14-16-18-20-24-32
1-5/16	12-14-16-18-20-24-32
1-3/8	8-10-14-16-18-20-24
1-7/16	8-10-12-16-18-20-24
1-1/2	8-10-14-16-18-20-24-28
1-9/16	18-20-24
1-5/8	5½-8-10-12-13-16-18-20-24
1-11/16	10-12-14-16-18-20-24
1-3/4	8-10-12-14-16-18-20-24
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20-24
1-15/16	8-10-12-14-16-18-20-24-28
2	4-1/2-8-10-12-16-18-20
2-1/16	12-14
2-1/8	12-16-20
2-3/16	12-16
2-1/4	4-1/2-8-12-14-16-18
2-5/16	12-18
2-3/8	12-16-18
2-1/2	8-10-12
2-9/16	18
2-5/8	12-16-20
2-3/4	16
2-7/8	8-12-16
3	8-16
3-1/4	8-12-16
3-1/2	8-12-16
3-7/8	8
4	8-12

HIGH SPEED LEFT HAND TAPS

SIZE	THREAD
0	80
1	56-64-72
2	56-64
3	56
4	32-36-40-48
5	40-44
6	32-36-40
8	32-36-40
10	24-30-32-40
12	24-28-32
1/4	20-28-32
5/16	18-20-24-28-32
3/8	16-24-32
7/16	14-20-28
1/2	12-13-20-28
9/16	12-18-20-24
5/8	11-12-18-20-24
11/16	11-16-24
3/4	10-16-18-20
13/16	16
7/8	9-12-14-18-20
1	8-12-14-16-18-20
1-1/8	7-12
1-1/4	7-12-16-18
1-3/8	6-8-10-12-16-18-20-24
1-7/16	8-10-12-14-16-18-20
1-1/2	6-8-10-12-16-18-20
1-9/16	8-10-12-16-18-20
1-5/8	8-10-12-14-16-18-20
1-11/16	8-10-12-14-16-18-20
1-3/4	8-10-12-14-16-18-20
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20
1-15/16	8-10-12-14-16-18-20
2	4½-10-12

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6. A 50x216 in. roll grinder shown grinding a test work roll at Landis Tool Co. This machine grinds such large rolls that it is more feasible to traverse the wheel-head than the work. The operator travels back and forth with the wheel-head.

The large traveling table grinders, taking roll sizes up to 30 in. in diameter, are equipped with crowning devices and the roll is always supported on its necks when regrinding the body.

Crowning on steel mill roll grinders is controlled either by tilting the wheel head about a trunnion near the forward end as previously described or by pivoting the table by means of a sine bar or cam bar. Occasionally it is required to grind a concave roll and this is accomplished in the same manner using a control cam of a different shape.

Next in size of equipment are the large traveling wheel head grinders, some of which will swing 60 in. diameters. This type grinder is called upon to do a large variety of work. Because of its size, it is usually the only grinder which can handle backup rolls that do not require a very fine finish, but which may have quite a bit of stock to remove. In short, this grinder is often called upon to do roughing operations. It may also be used to put a mirror finish on a 54 in. diameter temper mill roll. When not occupied on large rolls, it is kept busy grinding work rolls which may be as small as 25 in. in diameter.

Roll grinders of the type just described are capable of swinging large diameters, but the largest grinders from the standpoint of both diameter and center distance are found in paper mills. A good example of a large, modern paper mill roll grinder is the Farrel swing rest two-wheel roll grinder capable of swinging 42 in. and a length of 25 ft. Such a machine is shown in figure 7.

Paper mill roll grinding presents peculiar problems because of the extreme length of the work and the precise but minute taper or crown required. Calender rolls form the bulk of paper mill roll grinding and they may vary from 30 in. in diameter for a king roll down to 18 in. in diameter. These rolls average about 15 ft. in length. Stock removal is generally not over .010 — .015 in. on diameter, but the tremendous surface area (22 sq. ft.) makes the total grinding time very great.

On a 15-ft. long calender roll, .002 in. crown is not unusual. This represents a rise of only .001 in. in 7 ft. A special roll caliper with a dial indicator reading in .0001 in. increments is used to check the crown at 1-ft. intervals from both ends. Not only must the crown be of the specified magnitude, but it must also be centrally located lengthwise of the roll. The largest diameter must be precisely at the center of the roll.

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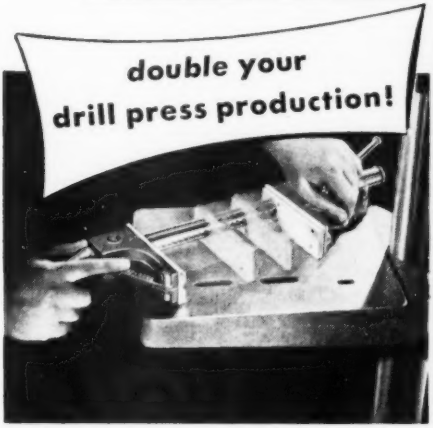

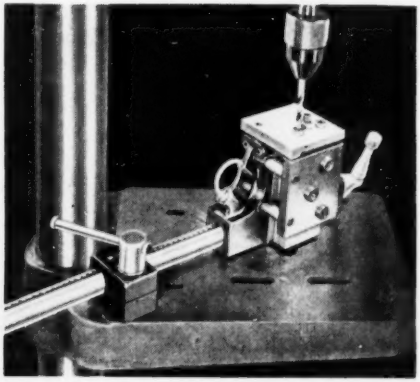

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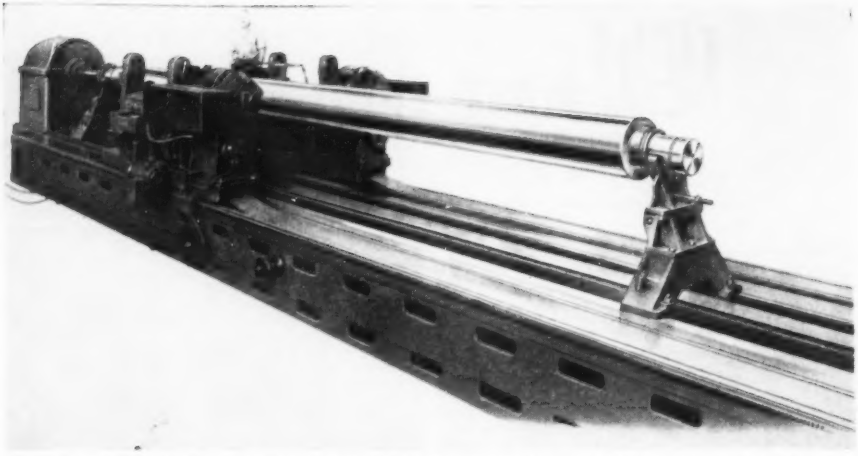

7. A Farrel Birmingham swing rest two-wheel roll grinder capable of swinging 42 in. and a length of 25 ft.

During grinding, paper mill rolls are customarily supported only at each end and two grinding wheel heads are used with the grinding wheels directly opposed on opposite sides of the work. Very light cuts are taken because of the unsupported nature of the work. Any long slender piece of work has a tendency, when being ground unsupported, to suddenly develop a whip. This apparently develops from the non-uniform relief of skin stresses as surface material is ground away. In paper mill roll grinding this is an ever present danger.

The swing-rest roll grinder shown in figure 7 has a pendulum principle built into the wheel head assembly, which will allow the two grinding wheels to follow a whip in the work should it occur after the work has cleaned up and the crown established, but the proper finish not yet generated. This saves a lot of extra grinding.

Paper mill roll grinder operators try never to stop the rotation of the work once finish grinding is commenced. Should the roll be stopped, it would sag enough during that short rest period to cause it to runout when grinding is begun again.

Some paper mill dryer rolls are so large in diameter that a special roll grinder has been designed to be brought to the roll without removing the roll from its bearings.

Shellac bond wheels are widely used in paper mill roll grinding because of their soft action.

It has been felt by some that roll grinding is no different from any other cylindrical grinding operation and that an atmosphere of mystery has been created to more or less protect a craft. Certainly this was true before the advent of roll grinding when all rolls were finished by turning even to the crowning.

It is only about 20 years since grinding was first introduced in roll shops, and came about because of the use of harder and harder metals in the rolls and a desire for better finishes on the rolled sheet.

There is no air of mystery surrounding present day roll grinding practice,

but roll grinding is different from ordinary cylindrical grinding. One of the major differences is in the size of the work—the average cylindrical job is not over 2 in. in diameter, while rolls vary from 1½ to 60 in. in diameter and up to 10 feet in length.

The very large surfaces ground on rolls makes necessary the peculiar practices mentioned earlier, such as infeeding in the middle of a traverse, adjusting the work supports during a grinding cycle, and infeeding by motor load indications rather than by graduations on the feed wheel collar.

Considering that the average cylindrical grinding job uses a 24 in. diameter wheel to grind work which averages 1½ in. in diameter, and a roll grinder uses a 36 in. diameter wheel to grind a roll 56 in. in diameter and 7 feet long, one begins to understand the reasons for infeeding in the middle of a traverse and some of the other peculiar manipulations which are observed in roll grinding.

In order to get the same rate of wheel breakdown per inch of traverse on a large roll grinding job as on a typical cylindrical grinding job, the roll grinding wheel would have to be much larger than the 36 in. wheel now so commonly used.

Larger wheels are not used for several reasons. Although the abrasive manufacturers can make a 60 in. wheel, machine builders shy away from such practice because it introduces design problems. The machine gets too big; the drive motor becomes too large. Designing for speed control for the entire range of wheel diameters, from new to worn-out, is extremely difficult.

The setup previously described (three wheels on one spindle) is obviously an attempt to make the size and power of the grinding head match the size of the job it is required to do. Three 36 in. wheels are mounted, side

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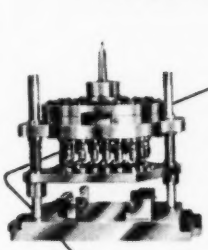

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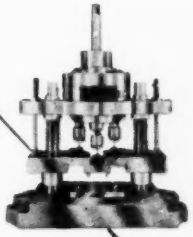

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by side, and are driven by a 100 h.p. motor. Even here the power of the wheels falls short of the actual requirements of the job, and serious complications are introduced when it comes to changing wheels.

Mills in one area tend to use wheels two and three grades harder than mills performing the same operation in another area. Some mills want a wheel that does not have to be dressed at all once it is mounted and trued. In other areas they are not adverse to occasional dressing.

It is evident that no general rule can be laid down for wheel gradings on a given operation in different plants. Table I does list, however, starting recommendations that illustrate an average of gradings used in roll shops.

Resinoid and shellac are the commonly used bonds in roll grinding wheels. In one plant, however, vitrified bond wheels are used on a severe roughing operation.

Disregarding the exceptions, resinoid is generally used for heavy roughing in the coarse grits and for high finish

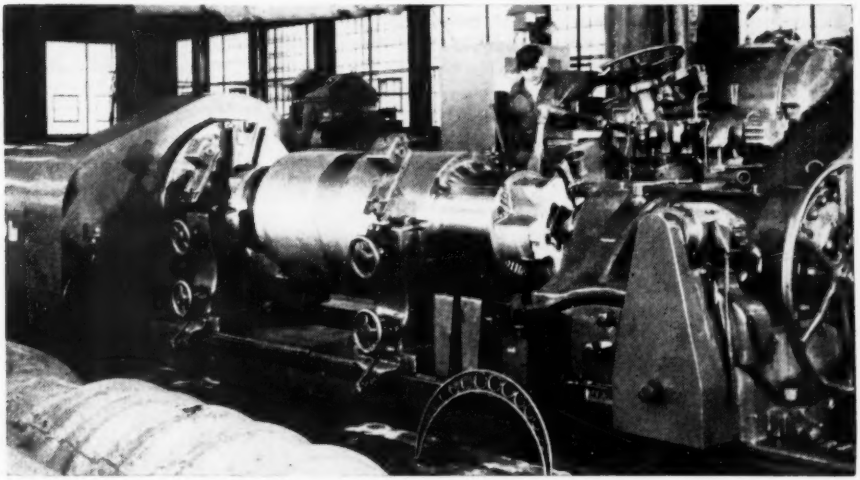
"Relax! That snoopy foreman is nowhere in sight."

in fine grits and B or BY bonds.

Shellac bond wheels are supposedly used on machines where loose spindle bearings or poorly fitted wheel head ways cause vibration and chatter. A shellac wheel is said to be elastic. In actual practice, however, shellac wheels are not often chosen for this reason, but rather on the basis of individual preference. Many shellac wheels are used on new machines which are in excellent condition. Shellac wheels do tend to be self dressing to a great degree and herein lies one reason for their selection.

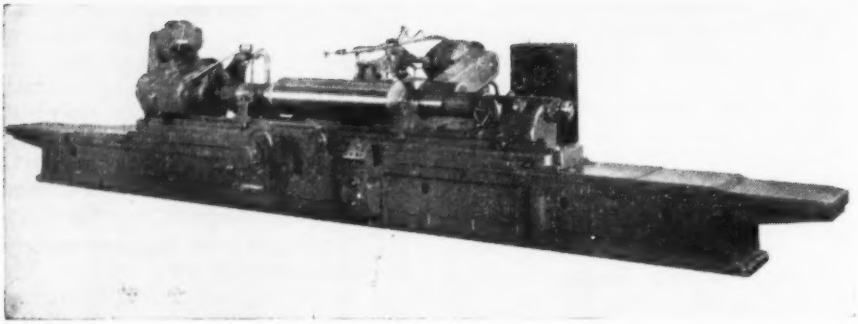
Vitrified wheels are used for at least three reasons: (1) they cost less, and in some shops this is important; (2) some roll grinding is done on ordinary cylindrical grinding machines and wheel speeds are not high enough to take advantage of resinoid wheels, and (3) some shops use vitrified wheels because of operator or foreman preference.

Roll grinding is no longer a mystery or closely guarded craft, but it is evident that there are many differences between roll grinding and ordinary cylindrical work.



Landis roll grinders in three types

Type F, Type 30 and Type B hydraulic roll grinders are designed by Landis Tool Co., Waynesboro, Pennsylvania., for specialized and generalized roll grinding. The former is a plain-roll gap, precision cylindrical grinder for heavy work pieces. Features have been selected on the basis of their importance in lowering unit production costs, producing finer finishes and simplifying maintenance. The difference between the Type F and FF is the weight that can be handled between centers, swings and lengths. The FR roll grinder is equipped with an equalizing drive plus a crowning and concaving mechanism. The FF gap grinder has a gapped table to swing work having projections. All the Type F grinders are equipped with pressure lubricated Microsphere wheel spindle bearings. Other important features of all these grinders are hydraulic table traverse, vee belt drives, built-in coolant reservoir, automatic way lubrication and built-in electrical equipment.

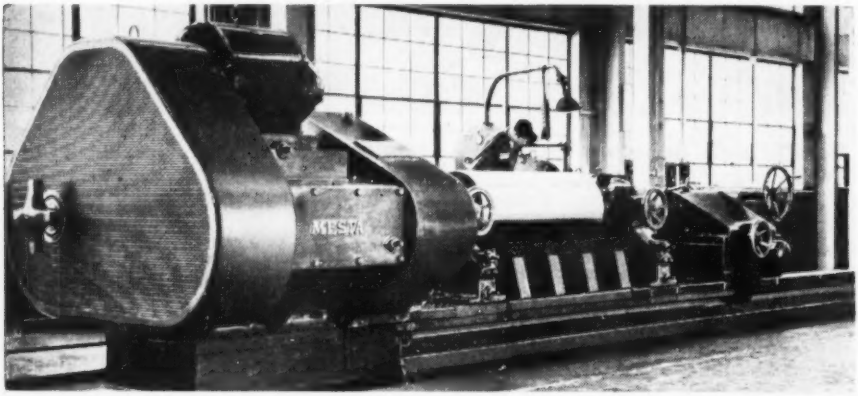


Cincinnati 20", 24" and 28"

Designed for precision grinding operations on large heavy work, these machines, product of Cincinnati Grinders Inc., Cincinnati 9, Ohio, are available in two styles: (1) with conventional center type grinder equipment for straight cylindrical and taper work; (2) with cambering equipment for roll grinding operations.

Plain machines are equipped with swivel tables for all lengths up to and including 168", while roll grinding machines are equipped with single tables and set-over footstocks. Features include automatic filtered lubrication of the table and cross ways. To compensate for various weights of work, the oil pressure to the table ways may be adjusted as desired. Reversal of the table at the end of its stroke is without shock. Filmatic bearings for the grinding wheel spindle and automatic balancing of the grinding wheel are other features.

An infinite number of table traverse rates are electronically controlled by a dial at the operator's working station; control levers and push buttons are convenient. There is a tilting wheelhead cambering unit that has a double eccentric for selection of convex and concave cambers.



Mesta roll grinder in two types

The Mesta traveling table type grinder made by Mesta Machine Co., West Homestead, Pennsylvania, is said to provide ease of operation and the

utmost precision for grinding diameters up to 28". To grind larger rolls on the traveling table type grinder would require movement of a heavy roll and slide table on an excessively long slide bed, and it would be difficult to see the grinding operation on large rolls.

The traveling wheel head type grinder has been designed for large work. In the traveling wheel type grinder floor space is conserved, the roll does not travel laterally, and a direct view of grinding is provided regardless of the size of roll.

A crowning and concaving mechanism is an integral part of all machines. Mestas are built mainly in the standard sizes; however, larger swings, longer bed lengths or special designs can be furnished if required.

Farrel heavy duty roll grinder

These grinders are built in six standard sizes to take maximum diameters of 24", 28", 36", 44", 50" and 60", in any length required. Manufacturer is Farrel-Birmingham Co., Inc., Ansonia, Conn. The spindle is made large in diameter to

Landis Tool Company — **Waynesboro, Penna.**

Type and Model	Size Max. Dia. Work Swing & Length Betw. Centers	M=Max. Dia. Mach. Will Grind G=Grinding Wheel	T=Table Traverse in./min. S=Speeds	Horsepower of wheel head Floor Space
Roll Grinder Type FR 16"	16¾"; 4, 6, 8, 10, 12, 14 ft.	G=30" x 3" x 12"	T=3" to 200" S=25 to 100	25 hp. Width is 9'-4". Lengths are 20, 24, 28, 32, 36, 40 ft.
20"	21¼"; 4, 6, 8, 10, 12, 14 ft.	G=do	do	do
24"	25¼"; 4, 6, 8, 10, 12, 14 ft.	do	do	do
Hydraulic Roll Grinder Type B 20"	20"; 8, 10, 12, 14, 16 ft.	M=20"; G=30" x 3" face	T=4" to 72" S=12 to 100	30-40 hp. Width is 8'-10". Lengths are 29, 33, 37, 41, 45 ft.
24"	24"; 8, 10, 12, 14, 16 ft.	M=24"; G=30" x 3" face	do	do
28"	28"; 8, 10, 12, 14, 16 ft.	M=28"; G=30" x 3" face	do	do
Roll Grinder Type 30 36"	Length between centers x 3" in excess of specified distance. Swing is 38"	M=36"; G=36" x 4" x 12"	T=2" to 65" S=10 to 40	40 hp. Width is 18'-10". Lengths are: 40'-10", 43'-10", 45'-4", 46'-10", 49'-10", 51'-4"
44"	do Swing is 46"	M=44"; G=do	T=2" to 65" S=7½ to 30	40 hp. Width is 20'-7". Lengths are: 48', 49'-6", 51', 54', 55', 6", 57', 60'
50"	do Swing is 52"	M=50"; G=36" x 4" x 12"	do	40 hp. Width is 20'-7". Lengths are: 48', 49'-6", 51', 54', 55', 6", 57', 60'
60"	do Swing is 62"	M=60"; G=do	do	do

assure rigidity under working load. The wheelhead rests on a subbase which is hinged in front on two tapered trunnions. These are adjustable to hold the subbase firmly without sidewise motion but to allow free vertical movement when crowning or concaving. The feeding of the grinding wheel to and from the work is accomplished by motor, or by an indexed handwheel for fine feeding. An improved design of carriage drive assures smooth, positive traverse, steadiness of travel and smoothly accurate reverse.

The Farrel patented crowning and concaving device is the adjustable, single eccentric type. All operating controls are within easy reach. Ways are the inverted V type. Both the carriage ways and the oil reservoir for the traverse worm drive in the center of the bed are covered by flexible metal guards. The bed is made of Meehanite metal, formed with deep box sections and heavily ribbed for strength and rigidity. The grinder is built with a multiple V-belt headstock drive which provides maximum smoothness for the rotation of the rolls.

Cincinnati Grinders, Inc. — **Cincinnati 9, Ohio**

Type and Model	Size of Machine	M=Max. Swing Over Table G=Grinding Wheel Size	T=Table Traverse In./Min. R=Range of Spindle Speeds	Horsepower of Wheelhead Motor and Floor Space
Roll Grinder 20" Heavy Duty	20", 10, 12, 14, 16 ft.	M=20½" G=30"x3"x20" hole	T=3" to 120" R=20 to 72 or 15 to 54	HP=25/30; Width is 14'½"; Length is 31, 35, 39, 44, 48 ft.
24"	24"xdo	M=25" G=do	T=do R=15 to 54 or 12 to 43	HP=25/30; Width and Length same as above
28"	28"xdo	M=28½" G=do	T=do R=15 to 54 or 9 to 32	HP=25/30; Width is 14'½"; Length is 32, 37, 41, 45, 49 ft.
Roll Grinder 36"	36"x10, 12, 14, 16, 18, 20, 22, 24 ft.	M=37 7/8" over bed G=36"x4"x12" hole	T=¾" to 75" R=10 to 40	HP=30/50; Width is 20'9"; Length is 32, 34, 36, 38, 40, 42, 46 ft.
44"	44"xdo	M=45 7/8" over bed G=do	T=do R=9½ to 38	HP=30/50 Width is 21'; Length is same as above
50"	50"xdo	M=51 7/8" over bed G=do	T=do R=9 to 36	HP=30, 50 do
60"	60"xdo	M=61 7/8" over bed G=do	T=do R=8 to 32	HP=30/50 Width is 21'2"; Length is same as above
Roll Grinder 16"	16"xSix lengths between centers; 48", 72", 96", 120" 144", 168"	M=16½" G=30"x3"x20" hole	T=3" to 120" R=20 to 72	20 hp.
20"	20"xdo	M=21" G=do	T=do R=15 to 54	20 hp.
24"	24"xdo	M=24½" G=do	T=do R=14 to 51	20 hp.

Farrel-Birmingham Co. — Ansonia, Conn.

Type and Model	Size of Machine	M=Max. Dia. Machine Will Grind G=Grinding Wheel Size	T=Table Traverse In./Min. R=Range of Spindle Speed	Horsepower of Wheelhead and Floor Space
Roll Grinder 24" Heavy Duty	24"x8, 10, 12, 14, 16, 18 ft.	M=25" G=30"x3" face	T=2½" to 72" R=16 to 64	30 hp. Width is 9'6" Lengths are 21'6", 23'6", 25'6", 27'6", 29'6", 31'6"
28"	28"xdo	M=29" G=do	T=do R=16 to 64	30 hp. Size=do
36"	36"x10, 12, 14, 16, 18, 20 ft.	M=37" G=36"x6"	T=2½" to 108" R=11 to 44	40 hp. Width is 12'; Lengths are 25'2", 27'2", 29'2", 31'2", 33'2", 35'2"
44"	44"x12, 14, 16, 18, 20, 22, 24 ft.	M=45" G=do	T=do R=9½ to 38	40 hp. Width is 14'; Lengths are 30'4", 32'4", 34'4", 36'4", 38'4", 40'4", 42'4"
50"	50"xdo	M=51" G=do	T=do R=8 to 32	40 hp. Size=do
60"	60"xdo	M=61" G=do	T=do R=7 to 28	40 hp. Width is 14'10"; Lengths are 31'9", 33'9", 35'9", 37'9", 39'9", 41'9", 43'9"
Roll Grinder 24" With Traveling Table	24"x8, 10, 12, 14, 16, 18 ft.	M=26" G=30"x3"	T=4.8 to 82 R=16 to 64	30 hp. Width is 9'; Lengths are 25'4", 29'4", 33'4", 37'4", 41'4", 45'4"
28"	28"xdo	M=29" G=do	T=do R=16 to 64	30 hp. Size=do
32"	28"xdo	M=33" G=do	T=do R=12 to 48	30 hp. Width is 9'; Lengths are 26'1", 30'1", 34'1", 38'1", 42'1", 46'1"

Mesta Machine Co. — Pittsburgh, Penna.

Type and Model	Size D=Dia. Swing DC=Dist. Between Centers
Roll Grinders 24" Traveling Table	D=24" DC=8, 10, 12, 14, 16 ft.
28"	D=28" DC=8, 10, 12, 14, 16 ft.
Roll Grinder 36" Traveling Wheel Head	D=36" DC=10, 12, 14, 16, 18, 20 ft.
44"	D=44" DC=12, 14, 16, 18, 20, 22, 24 ft.
50"	D=50" DC=12, 14, 16, 18, 20, 22, 24 ft.
60"	D=60" DC=12, 14, 16, 18, 20, 22, 24 ft.

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AVAILABLE LITERATURE

Catalogs, bulletins available from manufacturers

1. Precision lathes, micro-drill presses and watchmakers' tools, products of Louis Levin & Son, Inc., Dept. BB, 782 East Pico Blvd., Los Angeles 21, Calif., are featured in a 32-page catalog. Numerous application photos of jewelers' lathes, showing many interesting setups.

2. Soldering irons and soldering iron tips for industrial applications are described in a new bulletin announced as available from the General Electric Co., Dept. BB, Schenectady 5, N.Y. Designated GEA-4519, the eight-page, two-color publication uses photographs, diagrams, and tables to describe soldering iron construction, application, ratings, and prices. Also included is a full page chart which describes the purpose of flux and which flux is best suited to the base material or applied finish.

3. Descaling hot-rolled steel sheets by airless blasting and eliminating acid disposal problems are the topics discussed in a new bulletin (No. 914) published by American Wheelabrator & Equipment Corp., 1172 South Byrkit St., Mishawaka, Ind. Giving an actual case history with performance data, and illustrated by photographs of the equipment employed, plus a flow diagram of a sheet descaling line, this bulletin shows how important savings were made available to one company by airless blasting, because it was able to conveniently employ hot-rolled steel in place of cold-rolled.

4. The current trend toward increased industrial application of high speed heating serves to highlight a new bulletin just released by Surface Combustion Corp., Dept. BB, Toledo, Ohio. This bulletin, SC-162, deals with high thermal head heating, with gas or oil, for press forging, upsetting, extruding stress relieving of ferrous and nonferrous metals. Basic furnace designs and burner arrangements are described in conjunction with the demands of overall or selective heating for semiautomatic or fully automatic production.

5. The application of AB-1 circuit breakers to reduce downtime and maintenance is discussed in Booklet B-5456 issued by the Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. Actual cases—with savings given—show how the replacement of fused devices by AB-1 circuit breakers results in improved continuity of operation.

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6. Wheel dresser. Said to eliminate the special equipment or makeshift setups for dressing the wheels of surface grinders to required angles, Sine angle wheel dresser, product of Florian Mfg. Co., Plantsville, Conn., is described and illustrated in folder available through its distributor, American Standard Co., Dept. BB, Plantsville, Conn.

7. Vertical single slide surface broaching machines built by Acme Broach Corp., Dept. BB, Milan, Mich., in a wide range of power and stroke capacities, are reviewed in an illustrated brochure containing table of specs.

8. "Labor-Management Participation in Area-Wide Apprenticeship Systems," Technical Bulletin No. T-136, April 1953, includes a wide variety of facts and figures concerning industrial establishments and trade unions participating in apprenticeship programs. Copies may be obtained from Publications Branch, Bureau of Apprenticeship, U. S. De-

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partment of Labor, Washington 25, D. C.

9. Electrodes. An up-to-date 50-page pocket guide to Airco electrodes has been announced by Air Reduction Sales Co., Dept. BB, 60 East 42nd St., New York 17, N. Y. Over 30 different electrodes are described as to chemical analysis, procedure for welding and application. Also included: "Picking the Right Electrode," mechanical properties and testing of electrodes, and AWS-ASTM specifications.

10. Horizontal milling machines (No. 2 medium) manufactured by Van Norman Co., Dept. BB, Springfield 7, Mass., are described in a six-page brochure. In-

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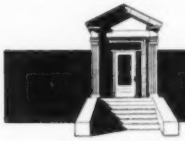
The small, precision-built machine you see above is the Radi-Form, a grinder attachment, that does almost everything but talk. The Radi-Form can move the work in a predetermined arc of any desired radius, from 1/16" to 2" concave, from .00 to 2" convex, which means that radii can now be generated even on carbide tipped cutting tools in a matter of minutes, to within .0005 accuracy on a standard, unformed, cupped diamond wheel. You save headaches, time, and gain increased production. Write for literature and prices that will surprise you.



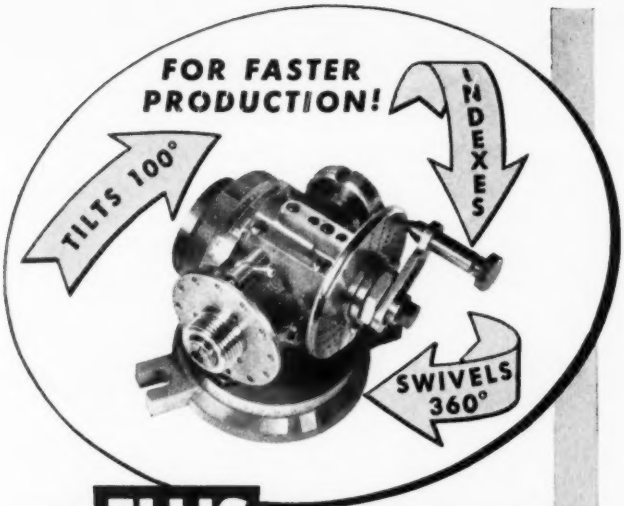
W. F. MEYERS CO., INC., BEDFORD, INDIANA

formation on design, control, operation, construction and application, together with specs table, is given.

11. Designed to aid small businessmen, three leaflets are available from Small Defense Plants Administration, Old Washington Post Building, 1337 E Street N.W., Washington, D. C. No. 28, "Business Insurance IV," explains various types of insurance available to the businessman. No. 24, "Surface Finishing Techniques III," discusses economical ways of finishing magnesium, copper alloys, and stainless steel workpieces. No. 25 is "Improving Maintenance Operations in Small Plants."

12. Precision instruments. A 37-page illustrated catalog of Etalon Swiss-made stainless steel measuring instruments has been prepared by Alina Corp., Dept. BB, 401 Broadway, New York 13, N. Y. Detailed instructions on measurement with the vernier caliper and a handy chart showing decimal and millimeter equivalents of fractional parts of an inch.

13. Soluble oil for use in practically all types of metal cutting, grinding and forming operations is described in an illustrated bulletin (SO53) issued by Shear-Speed Chemical Products, Div. of Michigan Tool Co., Dept. BB, 7125



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E. McNichols Rd., Detroit 12, Mich. General operating instructions and recommended dilutions are included.

14. Common applications of zinc dust are discussed in a leaflet of the Federated Metals Div., American Smelting and Refining Co., Dept. BB, 120 Broadway, New York 5, N. Y. Uses of zinc dust in the manufacture of bleaches, as a reducing agent, as a catalyst, purifier, precipitating agent, and as an additive to grease and other materials for pipe thread lubrication are detailed.

15. Recirculating furnaces. A 12-page bulletin, No. 81, on recirculating heat treating furnaces has been released by Despatch Oven Co., Dept. BB, 619 S. E. 8th St., Minneapolis, Minn. Pictured are designs of Despatch furnaces in operation on a variety of heat treating applications. Furnace performance records are given in several instances; also includes specifications for pot type, batch and conveyor type furnaces.

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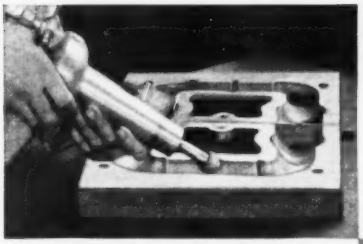
16. Heavy duty material handling clamps and devices are shown in detail in Bulletins No. 300 and No. 400, issued by Smith Devices, Inc., Dept. BB, 331 N. Fourth St., Philadelphia, Pa. Table of specifications is also included.

17. Measuring surface hardness with the Profilometer, product of Micrometrical Mfg. Co., Dept. BB, 345 S. Main St., Ann Arbor, Mich., is discussed in Bulletin LT77. It describes 7 ways in which the instrument is used for production and quality control, and shows typical applications in well-known plants.

18. Stainless steel bars. The first edition of a complete new technical book on stainless steel bars is available from Allegheny Ludlum Steel Corp., Dept. BB, Pittsburgh 22, Pa. Included is information on the selection of the proper stainless steel material for the job at hand. There are reference tables on sizes and shapes available, weights and corrosion resistance.



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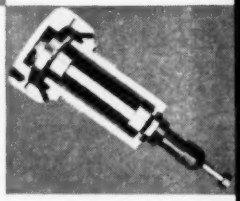

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19. Vises, rotary tables, milling attachments, angle plates, and other machine tool accessories, products of the Chicago Tool and Eng. Co., Dept. BB, 8383 South Chicago Ave., Chicago 17, Ill., are listed and pictured in catalog entitled "Palmgren Products." Specifications, operations, and prices are among information given.

20. Piezotronics, a new science using "pressure electricity" is explained and its uses outlined and illustrated in a publication, "Piezotronics," of the Brush Electronics Co., Dept. BB, 3405 Perkins Ave., Cleveland 14, Ohio. A companion book, "Piezotronic Technical Data" compares general properties of piezoelectric materials, describes their basic behavior, lists applications and electronic circuit considerations, and gives basic electrical, mechanical, and electromechanical properties and equivalent circuit data.

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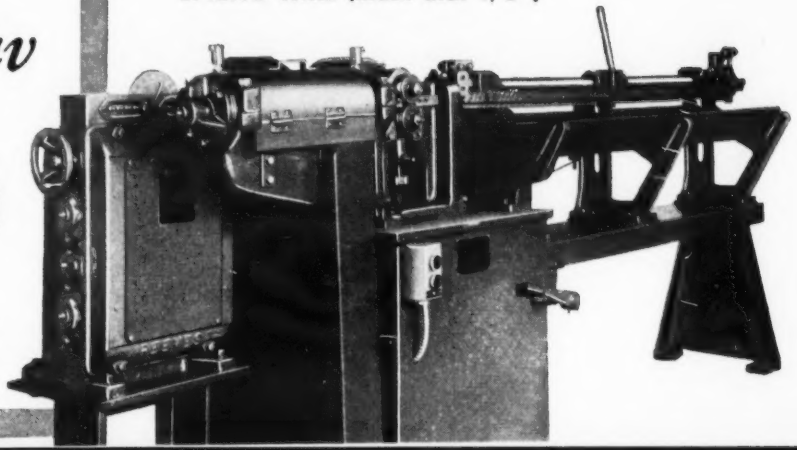

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BULLETIN

No. 53

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21. Titanium. The unique machining characteristics of titanium and its alloys are described by Mallory-Sharon Titanium Corp., Dept. BB, Niles, Ohio, in "Preliminary Machining Recommendations for Titanium." It is based on detailed studies of various machining operations. Covers turning, milling, drilling, tapping, grinding and internal grinding, abrasive and hack sawing and reaming.

22. Use of Cargotainers to cut materials handling costs is outlined in a brochure which has been released by Pittsburgh Steel Products Co., Dept. BB, Grant Building, Pittsburgh 19, Pa. Generously illustrated, complete technical information on both the manufacturer's models is given.

23. Application data for calculating the power requirements for heating processing tanks are featured in an electric

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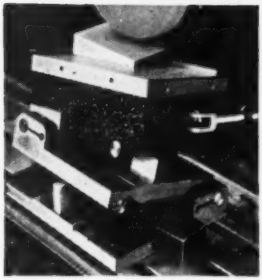
to gauge-block accuracy

IN A FEW MOMENTS



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immersion heater catalog which has been prepared by the Cleveland Process Co., Dept. BB, 7016 Euclid Ave., Cleveland 3, Ohio. Simplifying the problem of estimating heat losses, determining the correct KW needed and selecting proper heater size for tank capacity, it is easy to establish the most efficient and economical immersion heater installations.

24. Hack and band saw blades. Catalog No. 700, containing helpful data on the proper selection and use of hack and band saw blades, is offered by G. W. Griffin Co., Dept. BB, Franklin, N. H.

25. Automatic operation of doors in business and industry with Stanley Magic Door controls, product of The Stanley Works, Dept. BB, 195 Lake St., New Britain, Conn., is covered in a revised catalog. Controls described in detail include: push button, pull cord, floor switch, Magic Carpet, and photoelectric. Applications reviewed are en-

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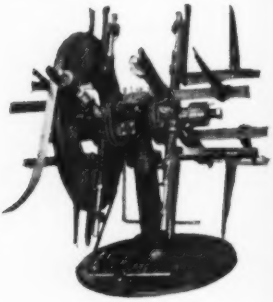

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Speed with Safety

ROLL FEEDS • DIAL FEEDS
STRAIGHTENING MACHINES
REELS • AIR BLAST VALVES
District Offices: Detroit, Cleveland

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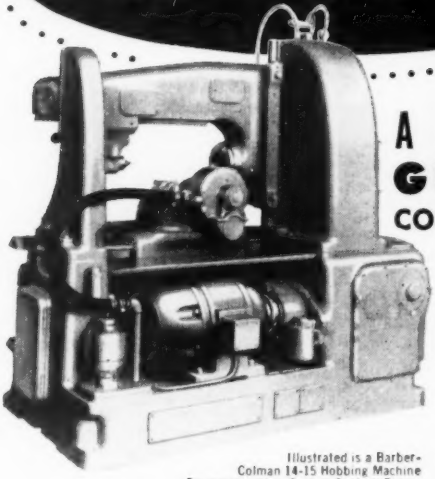
trance doors, service doors and a wide range of industrial installations.

26. High speed furnaces, manufactured by Surface Combustion Corp., Dept. BB, Toledo 1, Ohio, are topic of a 4-page brochure. Press forging, upsetting, extruding and stress relieving are considered, together with processes, overall or selective heating, ferrous and non-ferrous metals, automatic or semi-automatic production, and oil or gas firing.

27. How dielectric heat is able to overcome disadvantages of conventional core baking methods in foundries is described by Carl Loper of Allis-Chalmers electronics section in an article which appeared in the first quarter, 1953, issue of the Allis-Chalmers Electrical Review; tells of the development of the

FOR A LONG LIFE



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GUSHER
COOLANT PUMP

Illustrated is a Barber-Colman 14-15 Hobbing Machine Equipped with a Gusher Coolant Pump.

Every Gusher is specifically designed to give you long trouble-free service.
The rotating assembly is electronically balanced to eliminate vibration and wear. There's no metal-to-metal contact within the pump.
The overall construction is extremely simple with fewer moving parts.
Wear and maintenance costs are cut to a minimum.
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THE RUTHMAN MACHINERY CO.
1816 READING ROAD CINCINNATI, OHIO

dual heat core dryer, and discusses the preparation and curing of cores and core assembly and casting. Copies of "Curing Intricate Cores with Dielectric Heat," 15R7973, are available upon request from Allis-Chalmers Manufacturing Company, 1007 S. 70th St., Milwaukee, Wis.

28. **Wound rotor motors,** ½ to 1000 hp, manufactured by the Louis Allis Co., Dept. BB, Milwaukee 7, Wis., are covered in Bulletin No. 1300. Principles of operation, performance curves and characteristics that show how units are suited to particular jobs are contained in the publication.

29. **Vise face plates,** said to prevent marring of soft and finished materials, are discussed in a folder of the Kenimar Corp., Dept. BB, Glenville, Conn. Ask for brochure describing Nava-Mar vise caps.

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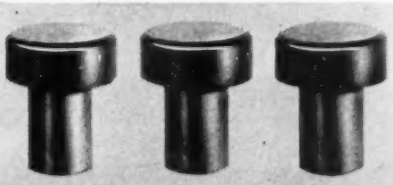
SPECIFY AND USE Morton

STANDARD FIXTURE CLAMPS AND COMPONENTS . . . . . .

A SAVING OF $62.35 ACHIEVED ON THIS JOB



3 REST BUTTONS COST a leading manufacturer $67.00 to make in his own plant. Now, MORTON-WISE, he buys MORTON RB-3 for $1.55 each.

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Achieved on Jig Feet, Rest Pads and other MORTON Standards. Largest selection of types and sizes of Fixture Clamps and Fixture Details in the Industry. Complete Assemblies or Individual Parts. Highest quality of workmanship and materials maintained. Immediate delivery.

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30. Drilling machine. Catalog DM of Wales-Strippit Corp., Dept. BB, 345 Payne Ave., North Tonawanda, N. Y., features the de luxe and standard models of their drilling machine. This machine is designed for precision layout, drilling, reaming and boring of holes. Catalog illustrates and describes setup methods as well as typical work performed.

31. Work drivers of the Skinner Chuck Co., Dept. BB, New Britain, Conn., said to be used instead of driving dogs, are discussed and pictured in a new catalog. Operation, application, direction of rotation, changing diameter range and maintenance are covered.

32. No. 15 drilling machines are described and illustrated in Bulletin 2963-G of the Buffalo Forge Co., Dept. BB, Buffalo, New York. Popular for all shops, and a versatile tool for varied types of drilling.

33. Kilns and electric furnaces. A catalog and parts manual covering 37

step up production with

STOW flexible shaft MACHINES

These dependable STOW FLEXIBLE SHAFT MACHINES save production time . . . speed up output . . . help lower production costs. Variable Speed Models shown are easily portable . . . cut down operator fatigue and increase on the job efficiency!

Constant Speed Models available. Also complete line of accessories designed to increase the utility of STOW Flexible Shaft Machines!

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STOW Manufacturing Co., Inc.,
30 Shear St., Binghamton, N. Y.

models of kilns and furnaces is offered by L & L Mfg. Co., Chester 62, Pa. Gives sizes, shipping weights and prices for both front loading and top loading models in 2050° F and 2300° F temperature ranges. Catalog also contains a complete temperature zone of cones chart and describes the use of pyrometers.

34. A calculating device which supplies bearing users with information necessary in the selection of ball thrust bearings has been introduced by Aetna Ball and Roller Bearing Co., Dept. BB, 4600 Schubert Ave., Chicago 39, Ill. Made in convenient handling size, its circular sliding scale selects the proper bearing size for the application under consideration.

35. "The Incentive Story," revealing plans used by top companies to get people to do better work, is being of-

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For Every Shop That Does Hardness Testing

This latest and most nearly accurate Hardness Conversion Chart is a necessity wherever hardness testing is done. It has been compiled and produced by CLARK, makers of the internationally respected CLARK Hardness Tester for "Rockwell Testing." Printed on heavy stock convenient for wall mounting, the chart is offered **free of charge** to hardness tester users. Just attach this ad to your letterhead or write "Send wall chart." A copy will be mailed to you without charge or obligation.

P.S. If you would also like information on CLARK Standard and Superficial Hardness Testers, we'll be glad to send that along too.

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fered by Cappel, MacDonald & Co., Dept. BB, Dayton, Ohio. It illustrates all phases of incentive planning, from conception to results; includes prize-campaign themes used by 44 leading companies; discloses secrets of actual prize-winning employees.

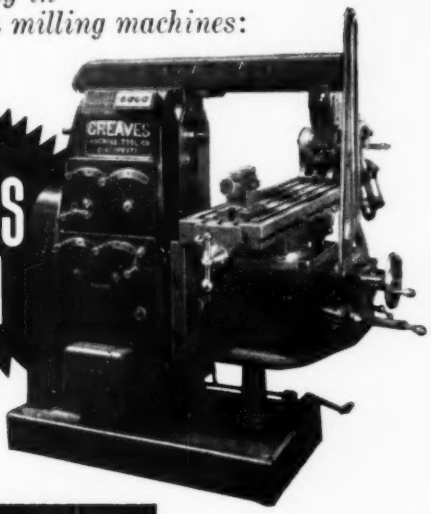
36. Fixture Clamps. Catalog No. 8, of the Siewek Tool Co., Dept. BB, 2862 E. Grand Blvd., Detroit 2, Mich., embodies over 50 new fixture clamps in various sizes and models. Over 15 fixture details have been added to the new styles.

37. "The Diamond that Pays for Itself" is a well-illustrated publication which shows the applications of industrial diamonds. Sixteen short tabloid pages are filled with interesting information. Write to Industrial Diamond Assoc. of America, Inc., Dept. BB, 124 E. 40th St., New York 16, N.Y.

38. Flaw location. Booklet A-500, issued by Turco Products, Inc., Dept. BB, Terminal Annex 2649 Los Angeles 54, Calif., outlines the applications of Dy-Chek and Chek-Spek, dye-penetrant

your best buy in modern milling machines:

GREAVES NO.2-H



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• **Offers every modern milling machine advantage:** 18 spindle speeds 25 to 1250 rpm, 18 feeds ½" to 30" per minute, rapid traverse, Timken bearings and many others.

You can't buy a better combination of simplicity, rugged construction, ease of operation, accuracy and production speed.

Send for bulletin and price list.

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2600 Eastern Avenue, Cincinnati 2, Ohio

methods of flaw location. Also contains listings of other products formulated for the metalworking industry and of offices in each major city.

39. **Marking devices and equipment** of the Newark Stamp and Die Works, Inc., Dept. BB, 203 Market St., Newark 2, N.J., are shown in their new 20-page catalog. Included are coining dies, embossing dies, hi-speed profiling, machine engraving, marking machines, mold engraving, press stamping dies, reverse letters and figures, reverse steel stamps, roller dies, rubber etching dies, etc.

40. **Tool bits, broaches, bushings.** Illustrated listings and descriptions of products of the duMont Corp., Dept. BB, Greenfield, Mass., are contained in three colorful brochures of the company. Chart included showing how toughness, wear resistance and heat resistance compare for the various steels commonly used in tool bits.

Star Performer
In The Reamer Field

Staples

CARBIDE-TIPPED
SHELL TYPE EXPANSION REAMER*

For maximum tool life with minimum tool servicing, put this Staples Shell Type Expansion Reamer on the job. Tool is returned to original diameter simple by driving the shell up the tapered arbor. Tool can be expanded many times without a re-grind. To obtain a new tool, just order a new shell—a standard stock item.

Standardize on Staples Carbide-Tipped Circular Cutting Tools. You'll get longer tool life—greater accuracy—finer hole finish—and spend less time on tool servicing. Staples is the **quality** name in carbide tool production. You'll save money in the **long** run with Staples.

*Patented.

THE STAPLES TOOL COMPANY, Cincinnati 25, Ohio
Distributors in Major Cities
Staples CARBIDE-TIPPED CUTTING TOOLS
A complete line of Circular Carbide-Tipped Cutting Tools
Expansion Reamers — Special Tools

41. Vernier caliper, measuring tools, height gage, dial indicator, dial indicator (graduated .0001"), depth gage with dial indicator—each described in a separate bulletin. All are available from Homestrand, Inc., Dept. BB, Larchmont, N.Y. Photographs, specifications, prices included.

42. Diamond tools. In the Coldset process, it is claimed, diamonds are set cold, without the use of harmful heat or pressure. Bulletin 11, reviewing their products, has been issued by American Coldset Corp., Dept. BB, 87 Court St., Paterson 3, N.J.

43. Technology, if allowed to progress unhampered, can double the living standards of the average U. S. family within the next 30 years. This is pointed out in "The Builders," a booklet of the Du Pont Co., Public Relations Dept., Wilmington 98, Del. Its 32 illustrated

SIGOURNEY

M-100

THE PRECISION BENCH DRILLING MACHINE

ACCURATE because table and column exactly squared one to the other.

LONG LIFE because of hardened and ground spindles.

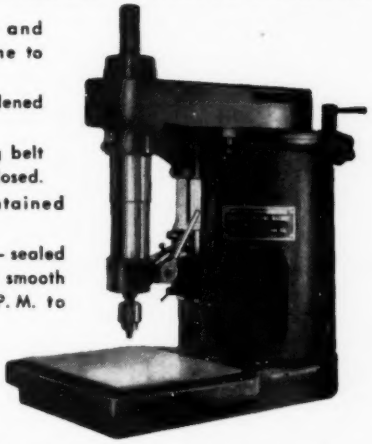
SAFE because motor, driving belt and spindles are entirely enclosed.

STRONG, RIGID for maintained accuracy.

SMOOTH AT HIGH SPEEDS — sealed ball bearings throughout for smooth operation from 4000 R. P. M. to 10,000 R. P. M.

MODELS — with 1, 2, 3 and 4 spindles.

Send for illustrated bulletin.



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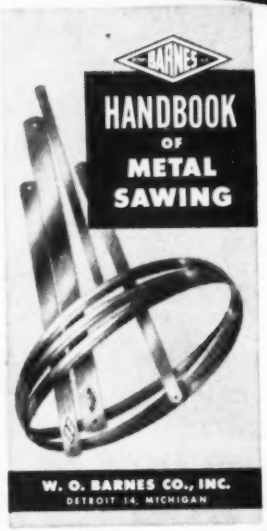
1SGB2

pages tell the story of the men whose labors have enlarged and widened our civilization.

44. Straight chrome stainless. With nickel-bearing steels such as the 18-8's under government regulations, steel users are often faced with the problem of finding a stainless that will do many jobs of the restricted grades. One step in this direction, according to the manufacturer, Carpenter Steel Co., Dept. BB, Reading, Pa., is the stainless No. 3 (Type 443). A folder compares workability and mechanical properties of Type 443 with those of Types 304 and 430.

45. Surface grinders for toolroom and production operations are described in well-illustrated 20-page catalog of The DoAll Co., Dept. BB, Des Plaines, Ill. Explained in detail are such features as 3-in-1 coolant system, variable speed wheel dressing feed, slip rings on feed

Free! BARNES HANDBOOK on HACK SAWING and BAND SAWING



Profusely illustrated with photos, charts and diagrams and loaded with technical data and explanatory sketches, Barnes Handbook of Metal Sawing is a must in every shop using Hand or Power Hack Saws and Band Saws.

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handwheels. Complete listing of attachments is also included.

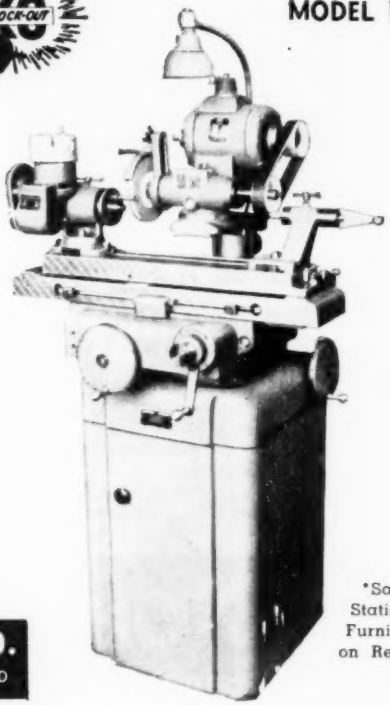
46. Vertical finishing machines. Equipment for precision of gears up to 15 feet in diameter for marine, railroad, power plant and ordnance use is covered in an 8-page illustrated bulletin, "V-Series Gear Finishing Machines" (No. V-53), available from Michigan Tool Co., Dept. BB, 7171 E. McNichols Rd., Detroit 12, Mich. Machine and motor specs, together with special features of the V-series machines, are also included.

47. A free pint of Penetrol oil, together with descriptive literature, can be obtained by writing on company stationery to The Flood Co., Dept. BB, Hudson, Ohio. The oil is said to have three major uses: (1) stops rust action on steel without the necessity of removing the rust; (2) is a reinforcing additive for practi-

There's a reason 76%*

of all popularly-priced Tool and Cutter Grinders sold in 1952 were "Knock-Outs"

MODEL B860



Will do anything that machines costing 2 or 3 times more will do . . . yes and in less time.

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K. O. LEE CO.
ABERDEEN, S. D

*Sales Statistics Furnished on Request

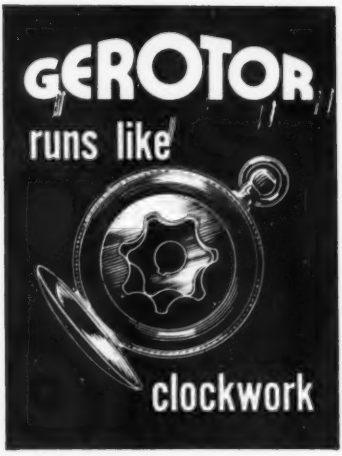
cally all air-drying oil type maintenance paints; (3) is a vehicle for aluminum paste or powder.

48. Carbide tipped reamers, drills, milling cutters, tool bits, and other tools for almost every machining operation are illustrated in the 82-page catalog (No. 53) of Wendt-Sonis Co., Dept. BB, Hannibal, Mo. Includes drawings and tables of tool dimensions and manufacturer's recommended resharpening directions.

49. Soldering flux. How to solder without surface cleaning is shown in step-by-step photos in leaflet issued by Lake Chemical Co., Dept. BB, 3052 W. Carroll Ave., Chicago 12, Ill. Describes use of their product, La-Co flux.

50. Integral-horsepower motors. A 20-page catalog containing specifications, illustrations and dimensions of its totally enclosed, fan cooled, squirrel cage motors up to 30 hp; and dripproof,

the GEROTOR mechanism runs like



because it's PRECISION engineered

In every GEROTOR pump, precisely paired gear-shaped elements transmit power from the shaft with high efficiency. These elements, revolving in the same direction at low relative speed, constitute the unique GEROTOR mechanism . . . famed for long life, less wear, less slippage, dependably smooth performance. Gerotor May Corp., Baltimore 3, Md.

GEROTOR hydraulic pumps

wound rotor and squirrel cage motors up to 125 hp has been published by Newman Industries Inc., Dept. BB, 43 Broad St., New York 4, N.Y.

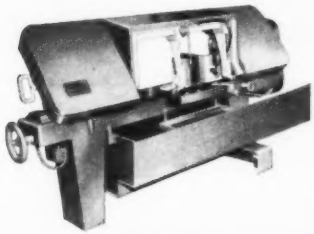
51. Cemented chrome carbide. A technical report on Carboloy grade 608 cemented chrome carbide, said to be a comparatively new powdered metal that is highly resistant to corrosion and erosion, has been issued by Carboloy, Dept. BB, 11177 E. 8 Mile Rd., Detroit 32, Mich. The report, CC-100, includes data on composition, manufacture, physical properties, application suggestions, finishing techniques and methods of attachment.

52. Precision measuring instruments. A comprehensive 208-page catalog (No. 22), designed to lie flat while in use, is available from Tubular Micrometer Co., Dept. BB, St. James, Minn. Contents include sections on general information, micrometers, snap gages, Vernier tools,

Kalamazoo

METAL CUTTING BAND SAWS

No stooping, no fumbling . . . just swing saw cover open and everything is at your fingertip. Release blade tension, remove blade, insert new one and tighten. It's as simple as that! Result? Minimum loss of time, less chance of damage to blade and of injury to operator.



This is but one of many exclusive Kalamazoo features that add up to lowest cost intermittent or continuous cutting. It will pay you to specify Kalamazoo Metal Cutting Band Saws . . . three sizes, available with coolant system and casters.

MACHINE TOOL DIVISION

Kalamazoo TANK and SILO CO.

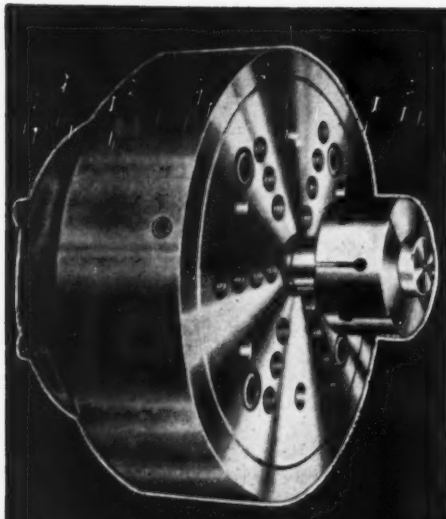
HARRISON ST., KALAMAZOO, MICHIGAN

steel rules, calipers, dial indicators, etc.

53. Mounted and small wheels, carbide burrs and abrasive discs, products of the Metal Removal Co., Dept. BB, 1546 N. Orleans St., Chicago, Ill., are discussed and illustrated in Catalog 25. A companion publication, featuring Preson abrasive discs, is also available. An interesting side light is a history and photographs of the company.

54. Abrasives, cutting tools, measuring tools. Precision Supply & Machine Co., Dept. BB, 12 River Rd., Fair Lawn, N.J., offers literature and catalogs on any products carried by them. Write for folder listing complete line.

55. Heat treating. A bulletin on helpful hints in heat treating tool steel has been released by the K. H. Huppert Co., Dept. BB, 6830 S. Cottage Grove Ave.,



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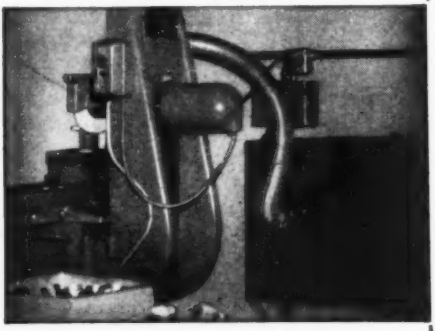
Ask for Catalog 605-2. Describe dust problems for recommendation by return mail — no obligation.



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Chicago 37, Ill. Should be of interest to all machine, tool and die shops who want to harden their own tool steels.

56. Helically-wound flexible metal hose and helically-corrugated flexible metal hose are illustrated and described in Catalog No. 200, published by Titeflex, Inc., Dept. BB, Newark, N.J. Contains information for ordering flexible metal conduit and ferrules, hose assemblies, ignition shielding and components for reciprocating engines, bendable pipe and high- and low-frequency leads.

57. Press brakes. Cincinnati press brake catalog No. B-4 reviews applications of press brakes; important fundamentals in selecting a press brake; filler blocks; and punching equipment and dies. Specification and dimension tables are also included. Write to Cincinnati Shaper Co., Dept. BB, Cincinnati 25, Ohio.

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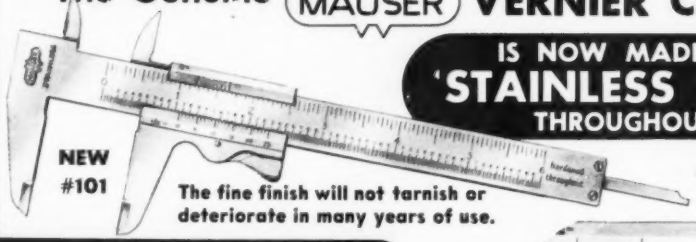
The Genuine MAUSER VERNIER CALIPER

IS NOW MADE OF 'STAINLESS STEEL THROUGHOUT



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The fine finish will not tarnish or deteriorate in many years of use.

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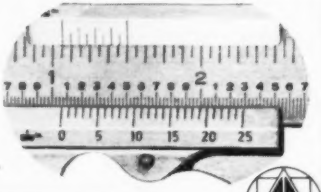

- ★ A SPECIALLY LONG VERNIER to read the thousandths
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Request Illustrated Folder showing complete line of MAUSER Toolmakers Calipers, Height gages, Bevel Protractors and Tool Stands.

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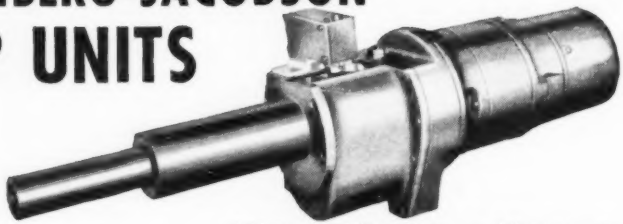
COMPLETE LINE OF PRECISION INSTRUMENTS

REHNBERG-JACOBSON TAP UNITS



Self-contained Tap Units are fully-automatic with feed positively controlled by an accurate lead screw. Capacities in four sizes range from 5/16-18 and 1-1/4" stroke to 1-1/2-6 and 4" stroke.

These units are all available for quick delivery. You can mount them on structures of your own to make practical and efficient production machine tools.

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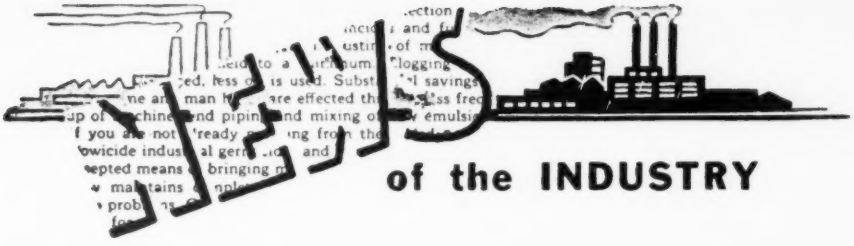
DESIGNERS & BUILDERS OF SPECIAL MACHINERY

R-J

2135 KISHWAUKEE ST. ROCKFORD, ILLINOIS



Norton Company's New Plant Hit by Tornado

NORTON COMPANY'S new six million dollar grinding machine plant suffered damage estimated at over one million dollars in the disastrous 10-minute tornado which hit Worcester, Mass., June 9. The plant was in the direct path of the twister which killed 73 persons in the Worcester area and caused damage totaling untold millions of dollars.

Norton's loss was limited primarily to the building itself. The steel decking of the roof was blown hundreds of yards, windows were shattered, siding stripped from the steel framework—although the structural members themselves suffered practically no damage. Water from broken pipes, broken glass and debris littered the entire factory and office area.

Fortunately no one was killed at the plant, and only eight were injured, some seriously. The low casualty rate was attributed to the fact that employees had the presence of mind to take cover under machines, tables, and desks. The twister struck just a few minutes after 5:00 p.m., as office personnel were leaving. The heavy rain which preceded the blow kept homeward bound employees waiting inside the office. This undoubtedly prevented a high casualty list at the plant. About 30 automobiles in the

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NOTE: For an account of the new plant as it was before the disaster and will be again, refer to page 323, July MACHINE and TOOL BLUE BOOK.

Over-all view of new Norton grinding machine plant taken just after twister struck. Shipping door is shown at center.

parking lot were demolished and several were blown 100 feet or more. The cafeteria at the Brooks St. plant was a mass of rubble.

Within hours of the disaster, repair efforts were underway. Dangerously loose light fixtures and steel decking were cut down and machinery covered or rustproofed. The most seriously hit side of the plant was line one, which handles heavy castings. The machines in this area were heavy planers and milling machines which were, for the most part, undamaged. Machines partially assembled were covered with debris and had to be cleaned and reassembled. Many papers and records were scattered by the wind.

Roof decking was rushed to the plant the following morning from warehouses and construction projects in the area, and temporary covering was hurriedly placed until permanent repairs could be made.

The remarkable job done by all service and engineering departments and the grinding machine division employees in cleaning up debris and restoring services made it possible for the plant to resume production at 80% of normal within only 62 hours.

Painting, packing, and erecting departments were temporarily relocated at the old machine plant on New Bond St. until permanent repairs were made.

All the while the company was cleaning and repairing its own damage, it was cognizant of the over-all disaster problem. The main hospital was kept open throughout the night following the tornado, giving first aid and treatment of minor injuries. The Norton field house was made available as a shelter for the homeless.

Although there were no deaths at the plant, three Norton people were killed either at home or en route from the plant. Thirty Norton employees and relatives were injured. Homes of scores of Norton people were demolished or damaged.

At an emergency meeting of all company supervisors the following morning, Milton P. Higgins, president, em-

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works BEST with
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Build more flexible "working circuits" into your basic machinery control system with P & B relays for . . . Screw Machines • Boring • Drilling, Tapping • Honing Lathes • Hobbing Indexing • Hydraulic Interlock

Buy stock model P & B relays from your local Electronic Parts Distributor. P & B field engineers located in principal U. S. & Canadian cities.

Write for Bulletin 100 illustrating over 100 types of standard relays.

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Also voltage actuated, current actuated, sensitive, hermetically sealed and plug-in types.

phasized that Norton Co. stood ready to give both personal and financial help to all employees active or retired and their families who suffered losses as a result of the tornado.

Immediate cash assistance was made available to those in need. Boxes and packing material for storage of personal effects were on hand. Norton trucks were on call to carry this material to homes and bring it back to the plant for storage.

The company also supplied building materials to close in employees' houses against the weather until permanent repairs could be effected.

Despite the interruption to employment and production resulting from the tornado, all Norton employees in both abrasive and machine divisions were compensated for time lost during the week of the disaster.

SPS buys Cooper Precision Products

Cooper Precision Products, a Los Angeles manufacturer of hex-head bolts

for the aircraft industry, has become a wholly owned subsidiary of Standard Pressed Steel Co., Jenkintown, Pa.

Both companies will continue to operate independently. Each will retain its own sales organization. No changes in management policy are planned. Harry S. Cooper will remain as president of CPP.

With but two exceptions, there is to be no exchange of personnel between the two companies. SPS is assigning **Albert A. Leedom,** manager of tooling and quality at the Jenkintown plant, and **Charles F. Roberts,** chief accountant there, to the Cooper management staff in Los Angeles.

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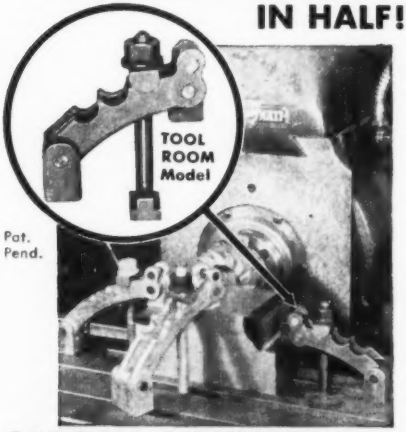
... CUTS SET-UP TIME IN HALF!



Pat. Pend.

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WITHOUT BLOCKS OR SHIMS, these revolutionary "universal-action" clamps of bowed arm design and forged construction provide absolute rigid clamping that *won't work loose!* No corrugations or serrations to wear down and allow slippage. UNIVERSAL Clamps quickly adapt to all T-slot work tables, punch and drill presses, mills, etc.

LOW COST, fool-proof clamps increase machine output up to 50%! Work pieces from paper thinness to 7½" are quickly clamped. Work-holding foot in horizontal position firmly grips narrow ledges or steps . . . also round bar stock in V-blocks. Available in "production" and "tool room" models. Unconditionally guaranteed.

See your DO-ALL or Industrial Supply Dealer . . . or write today for folder and low prices.

Pat. Pend.

AMI moves to Elizabeth, N. J.

Automatic Methods, Inc. have recently completed arrangements for moving all of their operations to Elizabeth, N. J., according to Sigmund Berlant, president. The new plant will combine all operations of three plants operating

in Newark into one larger plant having approximately 17,000 sq. ft. of floor space. The new grounds provide ample space for expansion of operations and plans have been made to extend the building to provide an additional 10,000 sq. ft. of manufacturing space.

ASEE meets at Gainesville, Fla.

The 61st annual meeting of the American Society for Engineering Education was held June 22-26, at the University of Florida, Gainesville, Fla.

Some of the matters that were taken up included: making better use of present engineers since a shortage seems imminent; trying to find remedies for the shortage of engineering teachers and high school mathematics and physical science teachers; closer cooperation with the industry of the country—manpower shortages, etc.; raising further the level of the engineering ethical creed and combatting attempts at unionizing the profession; sharing American scientific and engineering knowledge with other countries of the free world.

Fall schedule of industrial spray finishing classes given

The schedule for the latter half of 1953 is announced by the DeVilbiss Co. for courses of instruction in industrial spray finishing methods in its school of spray painting, now in its twenty-seventh year of tuition-free operation for users of DeVilbiss equipment. Applications should be made as early as possible for enrolling foremen, shop

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superintendents, maintenance supervisors, spray operators and any others who wish to attend the week-long classes as follows: August 17, September 14, October 12, November 9, December 7. These classes will be held in the modern school headquarters now in operation adjoining the main plant at Toledo.

Applications for all classes on the new schedule should be sent now to the DeVilbiss Co., Toledo 1, Ohio. Those interested may request School Form INS-753-A. There is no charge for attending, the only expense being transportation, board and lodging.

Westinghouse, Rolls-Royce sign agreement

The Westinghouse Electric Corp. and Rolls-Royce, Ltd., Derby, England, have signed an agreement providing for technical cooperation between the two companies for a period of ten years.

Subject at all times to the approval of the governments of the U. S. and the U. K., the agreement includes exchange of information in the design, development and production of gas turbine aeroengines and a limited interchange of personnel.

The first application of the contract is the collaboration of Rolls-Royce with Westinghouse in future development of Westinghouse jet engines.

Arc welding award program announced

The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, has announced a $13,500 arc welding award program for selected business and service establishments. Men or women engaged in any of the selected businesses may be able to earn an extra $1,000 this year by describing the use or possible use of arc welding in the maintenance, operation or services performed by the business. Awards will be made to individuals in nonindustrial businesses and service establishments such as bakeries, dairies, hospitals, hotels, food manufacturers, buildings, municipali-

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bends 2" x 2" x 3/16"
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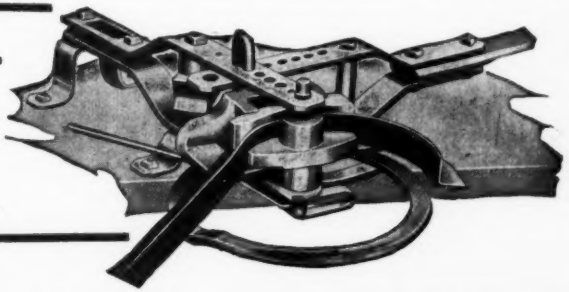

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Hydraulic unit provides plenty of bending power at your fingertips for smooth effortless bending. Reduce hand labor . . . speed up work . . . improve quality of bends. Fast and accurate, the Hossfeld Hydraulic Bender handles rounds, flats, pipe and angle iron. Forms rings, coils, "U" and "S" bends, eyebolts, spring eyes, etc. Gain higher production with lower labor costs.

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ties, cemeteries, printing plants and newspapers.

Hydraulic drill unit division formed by Rockwell Mfg. Co.

Rockwell Mfg. Co., Pittsburgh, has set up a separate division in its plant for the manufacture and sale of a new air-hydraulic drill unit.

This is the first power tool manufacturing operation to be conducted by the company in its Pittsburgh facilities, L. A. Dixon, Sr., exec. vice-president, pointed out. The new division is headed by **Ralph Caouette**, general manager of the firm's register division.

Metropolitan tool show held at Paterson, N. J.

The first annual Metropolitan tool show, sponsored by Roland Bollen, owner, Precision Supply & Machine Co., Fairlawn, N. J., was held recently at the Alexander Hamilton Hotel, Paterson, N. J., and attracted 1,200 visitors from northern New Jersey and the N. Y. C. metropolitan area.

A partial list of exhibitors follows: DuMont Corp., Greenfield, Mass., demonstrated its DuMost tool bits and other products. Flinn Mfg. Co., Detroit, Mich., exhibited boring bars. Homestrand Inc., Larchmont, N. Y., demonstrated its Swedish precision tools. Of particular importance was their metron precision dial indicator, claimed by the company to be entirely new in design. American Coldset Corp., Paterson, N. J., had on exhibit a half-million-dollar display of industrial diamonds from various parts of the world. L. H. Chappel & Co., Fairfield, Conn., sole U. S. representative of several English firms, exhibited the Summit line of metal slitting saws and the Centec universal milling machines. Eutectic Welding Alloys, Flushing, N. Y., showed a 20 min. film and distributed their booklet, "Tool and Die Salvage Manual."

Franke Gear Works incorporated

Franke Gear Works, Chicago, announces incorporation as Franke Gear Works, Inc. **William F. Franke**, founder and sole owner for 15 years, is retiring

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from activity with the firm other than remaining on the board of directors. Control will be held principally by a group of key employees and officials, all with a score or more years of experience in the gear field. Heading the group are **Carl T. Franke**, president; **H. J. Karolczak**, sec. & treas.; **V. A. Tinaglia**, vice-pres. and sales mgr.; and **Joseph W. Tinaglia, Jr.**, assistant to the president, in charge of manufacturing & engineering.

Kelso decorated by French

A. Donald Kelso, president of Norton Behr-Manning Overseas Inc., and vice-president of Norton Co., both of Worcester, Mass., was made a Chevalier of the Legion of Honor, May 20.

Kelso was decorated by Francois Charles-Roux, French Consul-General for New England at ceremonies in observance of Lafayette Day.

The honor was bestowed in recognition of services to the French cause in the six state New England area and for aid given the people of France.

The corporation which Kelso heads handles all export business and he directs foreign plant operations of Norton Company and its subsidiary, Behr-Manning Corporation of Troy, New York. Norton Behr-Manning Overseas Inc. operates two plants in France: one for grinding wheels and one for sandpaper.

Manufacturers assoc. announces new officers

Fred W. Gollbach, president, Ace Tool & Die Co., and chairman of the board of Ace-Central States Machine Tool Co., has been elected president of the Detroit council of the National Tool and Die Manufacturers Assoc. The council represents more than 40 contract tool and die shops in the Detroit area.

Other council officers elected to one-year terms were the following: **Daniel Karpinski**, owner, Westlof Tool & Die Co., first vice-president; **H. E. Hurkett**, president, Pattern Products Mfg. Co., second vice-president; and **H. A. Kramer**, partner, Crosstown Mfg. Co.,

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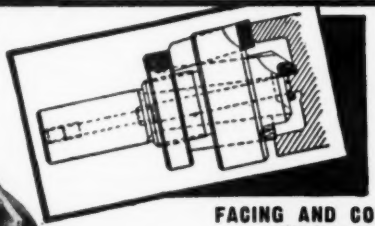
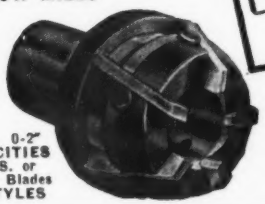
HOLLOW MILLS - UNDERCUTS - FACES - CHAMFERS BORES AND SPOT DRILLS

ADUSTABLE HOLLOW MILLS



Your production tool problems are our problems. That's the reason many manufacturers turn to our engineering department for confidential assistance. Experience gained from more than 40 years of "know how" is yours for the asking. Write today for Catalog 48-H.



STD. 0-2" CAPACITIES H.S.S. or T.C.T. Blades 10 STYLES

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secretary-treasurer.

Gollbach, Karpinski and Hurkett were also elected to three-year terms as directors of the council, while **Frank N. Decker**, general manager, Precision Boring Co., and **H. D. Kiefer**, president, Interstate Tool Co., were named for two years. Chosen for one-year directorships were **David J. Bathgate**, vice-president, Oval Tool & Die Corp., and **M. L. Jacobs**, president, Superior Tool & Die Co.

Nichols new bearing manufacturers president

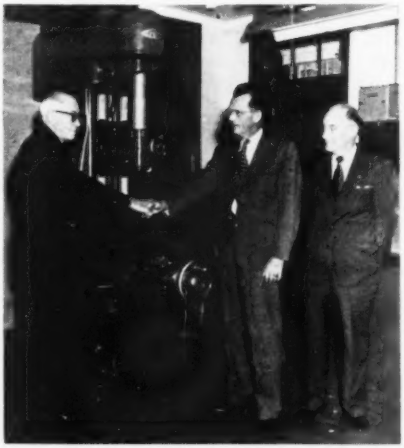
R. B. Nichols, president and general manager of the Bantam Bearings Div., Torrington Co., South Bend, Ind., has been elected president of the Anti-Friction Bearing Manufacturers' Assoc. for a one year term.

Mitchell chosen head S.D.P.A.

William D. Mitchell, of Denver, Colo., recently took oath of office as administrator of the Small Defense Plants Administration. A member of the Bars of the District of Columbia, U. S. Supreme Court and the state of Utah, Mitchell is also a major in the Officers Reserve Corps.

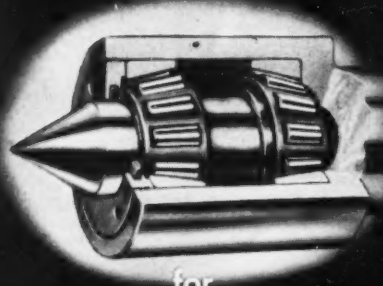
Two thousandth Moore machine

The two thousandth Moore machine, a Model No. 2 jig borer, was recently



. . . heavy loads at high speeds

Falls ROTO CENTER



for lathe and grinder tail stocks

Accurate, low cost turning on tough continuous-run work. Preloaded, matched roller bearings assure rigid set-up. Precision ground shank. Heavy-duty grease seal. Many exclusive features.

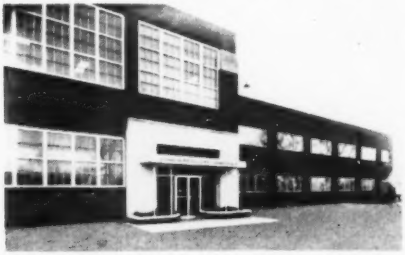
PRODUCTS Falls INCORPORATED

FALLS PRODUCTS, INC., 122 Genoa Street, GENOA, ILL., U.S.A.

shipped from the Bridgeport, Conn., plant of Moore Special Tool Co., Inc., to Eastman Kodak Co., Rochester, N. Y. Giving the precision machine a special send-off are (left to right): Hadar Wahlquist, production manager; Richard F. Moore, president; and Ed Shaw, sales manager. The total of two thousand machines does not include the Moore Panto-Crush wheel dresser, an accessory produced by Moore for surface grinders.

New addition to Sunnen Products Co.

More than 2,000 business and civic leaders of St. Louis recently attended an open house dedicating a new addition to Sunnen Products Co. The new



22,000 square foot, air-conditioned building houses executive offices; honing laboratory; design and development, and customer service departments.

Carpenter expands West Coast facilities

An open house commemorated the opening of a new mill-branch warehouse and office for The Carpenter Steel Co. at Belmont, Calif. Visitors from the Carpenter home office in Reading, Pa., included Frank R. Palmer, president, and E. Von Hambach, research and development engineer. Combined with the company's Los Angeles facilities, the new installation enables Carpenter to offer a more complete service and stock to West Coast users of tool, alloy and stainless steels.

D. J. O'Neil, Pacific Coast manager for Carpenter, is in charge of the Belmont warehouse and office. The salesmen working out of the new headquarters are **M. J. Brown** and **K. C. Largent.**

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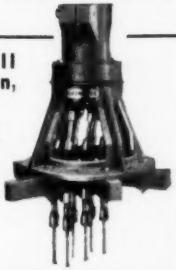
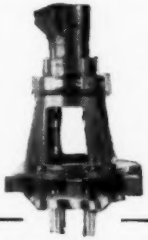
have these exclusive* features

***Standard Full Ball Bearing Construction, including Spindles**

Driving assembly is Full Ball Bearing mounted with 3 Bearings on each spindle. Thrust load carried by radial thrust bearings.





***Standard Slip-On and Slip-Off Template Construction**

For accurate setting and locating spindle brackets are machined to receive slip-on and slip-off template.

6 **Standard Models** . . . Models U-608 and U-1000—Ball Bearing. Models U-620B and U-1012B—Plain Bearing, 11/16" or ½" min. centers. Models U-608-BS and U-1000-BS—Ball Bearing Gear Case, Plain Spindles.

Semi-Standard Heavy Duty Full Ball Bearing . . . ½" in Cast Iron—1-7/16" min. centers—7⅛" or 9¾" dia.

½" in Steel—1-13/16" min. centers—7" or 9⅝" Dia.

Also Larger Adaptations and Full Line of Fixed Center Drill Heads.

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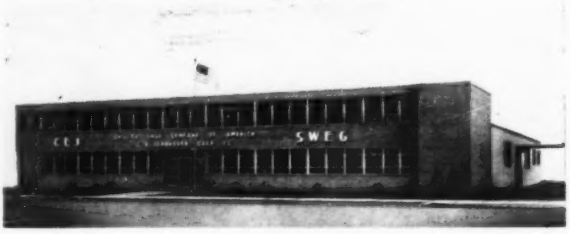
New plant for Swedish-Johansson companies



Swedish Gage Company of America and its affiliate, C. E. Johansson Gage Company, are now occupying a new plant located at 10641 Haggerty Ave., Dearborn, Mich.

Three times the size of their old building, the new air-conditioned unit, constructed of face brick and cement blocks, provides an area of 17,300 sq. ft. in office and manufacturing space.

Also included in the building are instrument assembly, gage block, inspection, and lap rooms. The gage block room is completely draft-free, and the temperature remains constant at 68°. Added features of the plant are a fireproof vault for office records and a fire-resistant room used to store certain valuable instruments.

Magnaflux builds

The newly built main plant by Magnaflux Corp. is located at 7300 Lawrence Ave., Chicago, Ill. This company has pioneered in the special field of testing for defects.

The new modern plant and main office building comprises 74,000 square feet, nearly twice the size of the old plant, used for 13 years, at 5900 Northwest Highway, Chicago. The operations are now all combined under one roof. The plant site is an area of nine acres, allowing room for future growth.

AMF opens development engineering laboratory

American Machine & Foundry Co. has opened a development engineering laboratory in Greenwich, Conn., as an expansion of design and development activities of their engineering division, it was announced recently by Fred K. Powell, Jr., vice-president in charge of engineering.

H. A. Oldenkamp will serve as director and R. A. Kimes as manager of the Greenwich organization. They were formerly chief engineer and assistant chief engineer, respectively, of AMF's Brooklyn plant.

The laboratory's development activities will include work on atomic energy,

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radar antennae, sonar, rocket launchers, gun loaders for heavy artillery, plant automation, textile machinery and automatic egg-grading equipment.

The company has signed a lease for a two-story, 20,000 sq. ft. building at 11 Bruce Pl., Greenwich. They plan to spend an estimated $500,000 on machinery, specialized equipment, furniture and extensive alterations to the interior of the building. A 60-car employee parking lot will adjoin the building.

H. A. Oldenkamp

R. A. Kimes

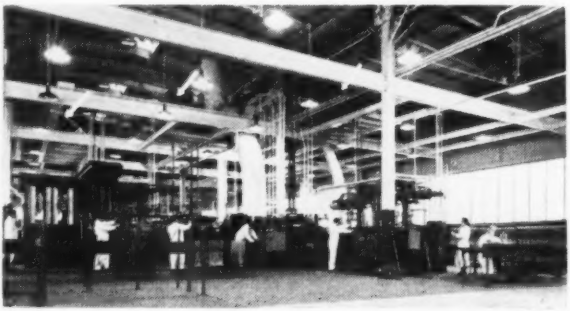
New Adamas carbide plant

Adamas Carbide Corp., Harrison, N.J., is erecting a new million dollar plant for the production of tungsten carbide tools, tool tips, dies, wear parts and powder at Kenilworth, N.J. In line with Adamas' recent expansion program, the new plant will increase production more than 50 per cent of present capacity. This is their third expansion.

The plant will be air conditioned and humidified and will feature straight line production.

Westinghouse expands

The new $640,000 electroplating plant of Westinghouse Air Brake Co. was placed in operation recently at the Swissvale plant of its Union Switch & Signal division, Pittsburgh, Pa.



Supplying power to the fully- and semi-automatic and barrel-plating equipment in the newly-opened electroplating installation at the Union Switch & Signal, division of Westinghouse Air Brake Co., are the overhead rectifiers identified by the arrows.

Other recent steps in the firm's expansion and diversification program include the purchase—as subsidiaries—of the George E. Failing Supply Co., Enid Okla., world's largest producer of portable oil-drilling rigs, and the Peoria, Ill., and Toccoa, Ga., plants of R. C. LeTourneau, Inc.

Introducing mass-production techniques to job-lot electroplating, the new plant features equipment for fully- and semi-automatic barrel and still plating of a variety of metals.

Milne adds Seattle sales office

A. Milne & Co., New York, N. Y., announces the addition of a new sales office in Seattle, Wash., under the management of **S. Robert Simonds.** This brings to 24 the number of principal cities where Milne branches or representatives are located.

Hobart builds welding electrode plant

Hobart Brothers Co's. new $3,000,000 electrode plant in Troy, Ohio, is now in full production. Facilities include shipping and receiving docks for both rail and truck transportation; unique chemical and wire storage facilities; production, quality control, testing, research, and experimental departments.

Firth Sterling opens warehouse

R. O. Valoon

Firth Sterling Inc. has announced the establishment of its new Chicago district office and warehouse, Melrose Park, Ill.

R. O. Valoon, with the company for nineteen years, has been appointed district manager of the Chicago district. He replaces **E. A. Carpenter**, who has resigned to establish his own business.

Appointments & Promotions

Edwin L. Karpick, engineering editor of "Steel" magazine, resigned recently to join Denham and Company, Detroit industrial advertising agency, in an executive capacity.

The Anderson Bros. Mfg. Co. has announced the election of **Walter E. Gunnerson** as vice-president in charge of sales.

Lloyd W. Jeffries is now general manager of both Valvair Corp. and its affiliate, the Sinclair-Collins Valve Co., Akron, Ohio. Jeffries succeeds **Kenneth E. Knotts**, who becomes sales representative in New York and New Jersey, with headquarters at 106 Miln St., Cranford 6, N.J.

Kenneth E. Knotts

Lloyd W. Jeffries

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A 40,000 RPM Unit

A powerful, versatile tool — can be fitted with three different spindle noses to handle mounted wheels with ¼" diameter shanks, also unmounted wheels with ¼" diameter and ⅜" diameter holes. Made with compound rotors. Fitted with steel body. Special grease-sealed bearings, no lubrication required. **NOTE SPEED** such as to operate Tungsten Carbide burrs, Rotary Files, etc., to their **FULL** efficiency.

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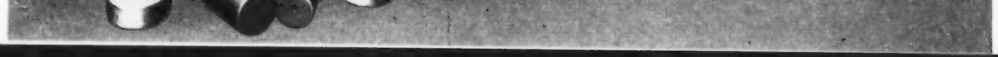

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ROTO HEAD uses the principle of the Swiss type automatic machines and economically produces duplicate parts from bar stock heretofore done only on the more expensive machines.
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334 E. WASHINGTON • LOS ANGELES 15, CALIF.
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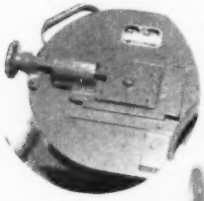
Firth Sterling Inc. has appointed **James E. Gray**, supervisor of carbide sales in the Chicago district, to be assistant manager of carbide sales. **Stuart A. Smith**, salesman in the Ohio district, replaces **Macon Jordan**, resigned, as Ohio district manager. **Lester N. Shannon, Jr.**, recently released from one year's service with the navy in Japan, is new district manager, southern district—a position formerly held by **C. E. Hughes**, resigned.

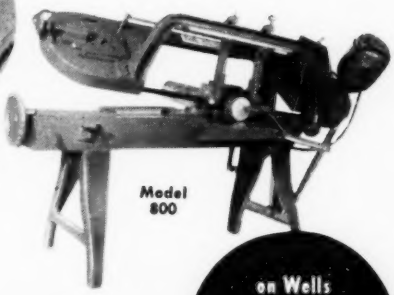
Stuart A. Smith

James E. Gray

NOW Wells offers you fool-proof blade tensioning . . .



Above is a close-up of the new Wells blade tensioning device.



Model 800

on Wells No. 5, No. 8, No. 12 and Model 800 cut-off saws

NOW IT IS POSSIBLE to maintain a constant blade tension on Wells cut-off saws. You can replace or change the blade any number of times, yet quickly and easily duplicate the correct blade tension. The new device is standard equipment on the models listed above. Simply turn the tension hand wheel until the fixed and moving indices coincide. At this point the blade tension is correct regardless of variation in blade length.

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION

707 Coolidge Ave. - Three Rivers, Mich.

Election of **John F. Haller**, vice-president in charge of engineering of Allied Products Corp., and **Eugene F. Wambold**, vice-president and general manager of Michigan Powdered Metal Products Company, Inc., an Allied subsidiary, has been announced.

Jack L. Modrich has become general sales manager for Mechanical Air Controls, Inc., Detroit, Mich.

L. N. Shannon, Jr.

John F. Haller

CHAMPION
E-X-P-A-N-D-I-N-G
MANDRELS

Precision Model

Standard Model

give *speed* to every set-up

The flexible sleeve, mounted on tapered arbor, expands automatically to fit the hole. Inserted by hand — no arbor press needed. Always an exact, positive, concentric fit. Locked by a single mallet blow. Unlocked the same way. CHAMPION Expanding Mandrels are used in machine shops around the world. Save time, cut production costs, whether the job calls for machining one piece or a thousand.

Precision Model has expansion range of .010". Available in regular sizes to fit holes from ½" to 3" diam. Holds work to tolerances of .0002" run-out. Guaranteed for precision grinding, turning and milling operations.

Standard Model maintains close tolerances, handles material of any length bore, hard or soft metals — from thin tubes and bushings to heavy castings and forgings. A set of fourteen will fit every hole from ½" to 9½" diam.

CHAMPION *Expanding Mandrels can be made in special shapes and sizes to fit any specifications. Quotations on request. Write for descriptive folder today.*

WESTERN TOOL & MFG. CO., INC.

Dept. 27 **Springfield, Ohio**

The appointment of **Frank X. Gilg** as an executive assistant in the boiler division of the Babcock & Wilcox Co. has been announced.

Jones & Lamson Machine Company, Springfield, Vt., has announced the resignation of **K. Hazen Woolson**, president of the company. **Hardage L. Andrews**, former executive vice-president of the General Electric Co., has been appointed as his successor.

Jack L. Modrich

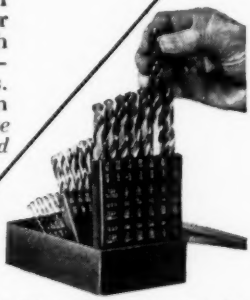
Hardage L. Andrews

Drills at your fingertips—

HUOT DRILL DISPENSER

Why rummage through a box full of drills when the Huot Drill Dispenser will keep them sorted by sizes? Each compartment holds many drills—several dozen in the smaller sizes. Beautiful light gray hammerlin baked enamel finish. *Made in three models for fractional, number and letter drills.*

Write for Drill Dispenser Bulletin



HUOT DRILL INDEX

The simplest filing system for all twist drills. Panels fold into container like pages of a book. Seventeen models for drills from No. 80 wire gauge to 1-inch size.

HUOT

HUOT MANUFACTURING CO.

563 North Wheeler Street, St. Paul W4, Minn.

H. W. Rittger has been appointed general sales manager of tool steel products of the Solar Steel Corp., Cleveland, Ohio, with headquarters at Solar Steel's Cincinnati plant.

Link-Belt Co. has appointed **Harvey V. Eastling** asst. general manager of its Pacific division, San Francisco. **Donald E. Thal** is now sales manager of the San Francisco plant.

Charles R. Van Riper has been ap-

Harvey V. Eastling

Donald E. Thal

1881 CAPEWELL

OIL HARDENING

GROUND FLAT TOOL STEEL

NON-DEFORMING TYPE

Microloy, Capewell's new oil hardening **Ground Flat Tool Steel** comes to you ready to lay out and cut . . . eliminates the costly, time-consuming job of grinding the bark off ordinary hot rolled tool steel to the desired size. This popular tool steel formula is ideal for all tool room applications such as gages, drill jigs, templets, punches, dies, stamps and special machine parts.

For complete information on Microloy, write:

THE CAPEWELL MANUFACTURING CO.
82 Governor St., Hartford 2, Conn.

20CA53

pointed district sales engineer by Norton Company for the Chicago district.

Edwin W. Shipman has been elected vice-president and manager of the licensee division of Illinois Tool Works, Chicago.

Waldes Kohinoor, Inc., Long Island, N. Y., has announced the appointment of **Leonard A. Kirsch** as assistant advertising manager of the company.

Charles R. Van Riper

Edwin W. Shipman

You can now retool speedily and economically . . . by replacing complete assemblies *precision built by Seibert*. Pictured is a Slip Spindle Assembly used in cluster plate applications. Shown are all of the component parts from the gear box to the drill. Vertical adjustment is obtained by use of Shur-Lock Adapter in the nose of the Slip Spindle. The Bracket Spindle Assembly and Arm illustrated upper right, can be substituted for the Slip Spindle where this type is used. The replacement of one member of these assemblies does not assure maximum efficiency. Insure yourself against costly machine down time by ordering complete assemblies.

Ask for our quotations . . . you'll be surprised at the small additional cost.

Write today.

SEIBERT & SONS, INC. CHENOA ILLINOIS

Vard Inc., Pasadena, Calif., has announced election of **Phillip R. Heim** to the board of directors, and appointed him vice-president in charge of manufacturing.

Nick S. Deanovich is the new Texas representative of the Gisholt Machine Co., Madison, Wis. His office is located at 4101 San Jacinto, Houston, Texas.

Frank R. Nichols, president of the Nichols Wire & Aluminum Co., Daven-

Phillip R. Heim

Nick S. Deanovich

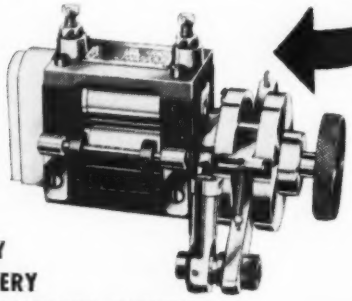
"RFC"
ROLL FEEDS

FITS ANY PRESS . . . bench or pedestal type high speed power presses. For side or rear feeding. Furnished complete with adjusting disc, mounting bracket and connecting linkage.

CAN'T SLIP . . . each wedge has 4 points of contact to safeguard accuracy.

REVERSES INSTANTLY . . . and easily. Merely shift feed finger spring from one lug to the other.

Ready for mounting!
Furnished complete.



FEEDS IN THOUSANDS . . . RFC Roll Feeds assure amazingly accurately stock movement.

MAINTAINS ORIGINAL SETTING . . . regardless of use or wear. No ratchets or pawls to wear down and "throw off" feed spacing.

EARLY DELIVERY ON STANDARD MODELS.

ROLL-FEEDS CORP.
An Electrix Affiliate
Pawtucket • Rhode Island

Write today for latest Bulletin

port, Iowa, announces the promotion of **M. J. Fey** to the position of executive engineer.

Illinois Tool Works, Chicago, has elected **James R. Russell** secretary of the company.

Appointment of **S. T. "Stogie" Williams,** formerly manager of engineering, military division, Continental Motors Corp., as works manager of Rosán Inc., Newport Beach, Calif., has been announced.

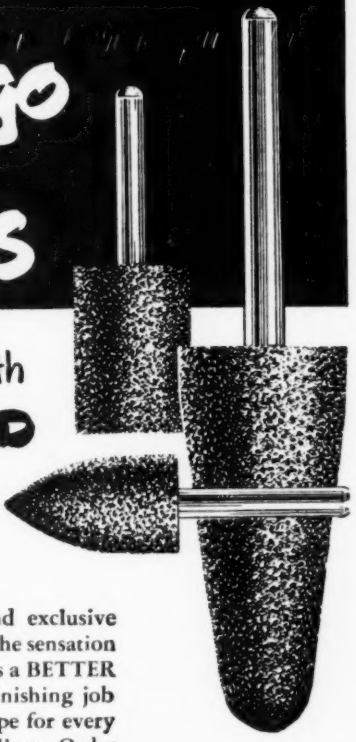
M. J. Fey

James R. Russell

Chicago MOUNTED Wheels

...now even better with

79E BOND



Buy Chicago Mounted Wheels—bonded with 79E Bond—and you'll never use any other!

79E—a tough new bond exclusive with Chicago Wheel—is the sensation of the industry . . . it does a BETTER grinding, burring, and finishing job FASTER. A size and shape for every use. Deliveries are excellent—Order today.

CHICAGO WHEEL & *Mfg.* Co.

Dept. MT • 1101 West Monroe Street, Chicago 7

Gordon W. Smithson was promoted to the position of chief engineer of the Potter & Johnston Co., Pawtucket, R.I.

Kenneth C. Spooner, sales manager, has been named vice-president of the Simmons Machine Tool Corporation, Albany, N. Y.

Clifford F. Hood, president, United States Steel Corp., has announced the appointment of **Earle E. Moore** as assistant to president and vice-president. Moore has been U. S. Steel's vice-

Gordon W. Smithson

Kenneth C. Spooner

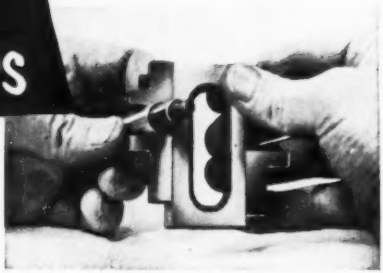
TEN THOUSAND GAGES AT YOUR FINGERTIPS

WITH

AMERICAN STANDARD

MULTI-GAGE

ADJUSTABLE SNAP GAGE and HOLE GAGE



MULTI-GAGE with snap gage jaws.

No valuable time lost waiting for delivery of special gages.

- SIMPLE TO SET WITH MICROMETER or BLOCKS
- LOCKS FIRMLY IN POSITION
- SPLIT TENTH ACCURACY

MULTI-GAGE with hole gage jaws.

If your dealer cannot supply you, write to

AMERICAN STANDARD COMPANY
Dept. B. Plantsville, Connecticut

president, industrial relations-administration.

The Mid-West Abrasive Co. announces that **A. C. Reppenhagen** has been elected president. **L. P. Jackson** will continue with the company as chairman of the board.

James A. Moody has been appointed district sales representative in the Philadelphia area for the C. A. Norgren Co.

Hugh D. Luke has been appointed dept. manager and **James A. Brandt**, assistant manager of a new production-planning unit in the mfg. dept. of the Reliance Electric and Eng. Co. at Cleveland. Promoted at Reliance's Ashtabula plant are: **A. S. Tusin**, engineer, to superintendent; **Robert B. Adams**, production manager, to night superintendent; and **Henry C. Dettenmayer**, staff assistant, to production manager.

Four new vice-presidents were elected by the directors of Thor Power Tool Co., Aurora, Ill. **J. A. Hill** was elected vice-president and sales man-

ager; **John A. McGuire** retains his present title of chairman of the executive committee and in addition becomes vice-president in charge of labor relations; **B. H. Johns** was named vice-president in charge of rock drill sales; **W. B. Hunn** was elected vice-president in charge of the company's Los Angeles works.

Four research and engineering department changes have been announced by Air Reduction Company, Inc. **Dr. L. I. Gilbertson** has been appointed director, in charge of the company's Murray Hill (N. J.) laboratories. He was formerly administrative manager at that location. **Dr. G. B. Carpenter** has been named manager of the development staff, with headquarters in New York. He was formerly manager, chemical division at Murray Hill. **Dr. A. Muller** was appointed director of metallurgical research. He was formerly manager, metallurgical division. **Dr. B. C. Redmon**, formerly with U. S. Industrial Chemicals Co., has been appointed director of chemical research.

Appointment of **Paul F. Mumma** as general superintendent of the Gary Works of National Tube Division, U. S. Steel Corp., was announced recently by Leo J. Mason, vice-president of this division.

A. W. Plier was named president and general manager of the D. J. Murray Manufacturing Company, Wausau, Wis.

F. L. Whitney has been appointed chief engineer of Walter Kidde Constructors, Inc.

The Industrial Abrasive Sales Div. of the Carborundum Co., Niagara Falls, N. Y., has announced several personnel changes. Among them are three retirements: **George S. Rogers**, Buffalo district sales manager, with 37 years of service; **William T. O'Mara**, general salesman, Buffalo sales district, with 41

NEW! Adjustable!
INSURES THE SAFETY OF YOUR WORKERS
"on the spot"
STA-PUT LIGHT
SPOTLIGHTS VITAL WORKING AREAS ON MACHINES, TABLES, BENCHES
Patent No. 2439009
Alternate Reflector Shape
Patented Ball and Socket Joint
• Adjusts to ANY position
• Available with 3, 4, or 5 Ball and Socket joints
• Equipped with round or peribold reflector
• Patented principle keeps light firmly in position
• Enclosed wire insures greater safety
• All moving parts protected from oil, dust and grit
• Can be furnished with porcelain sockets at no extra cost
• Four standard sizes: 29", 32", 36" and 40" overall
Manufacturers' Agents, Write for Particulars
Send for FREE Literature
STA-PUT LITE AND EQUIPMENT CORPORATION
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People work better when they SEE BETTER

In the General Electric Plant

Magni-Focuser helps a worker make adjustments on precision equipment.

MAGNI-FOCUSER's matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

MAGNI-FOCUSER

SPEEDS PRODUCTION

Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and *prevents squinting*—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

Now aiding thousands of workers, the Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. $10.50.

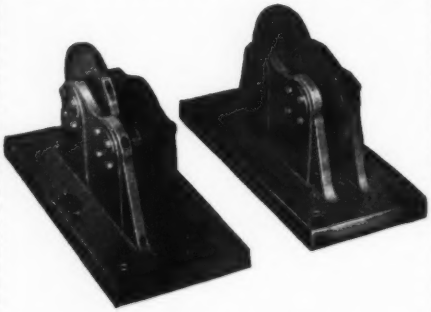
Send for descriptive folder

EDROY PRODUCTS CO. 480 Lexington Ave., Dept 14, New York 17, N. Y.

Anderson

PILLOW BLOCK BALANCING WAYS

Especially suited for large diameter work, as a sub-base can be made of proper height to give necessary clearance for work. Anderson Pillow Block Balancing Ways are precision built with chilled iron discs which rotate with minimum friction on sensitive special bearings. Many manufacturers have endorsed them for profitable, efficient, static balancing.



ROCKFORD Anderson BROS. MFG. CO. ILLINOIS

Built in 1,000, 2,000, 5,000, 10,000 and 20,000 Capacities

Write for Bulletin 8-5

ANDERSON BROS. MFG. CO., Rockford, Ill.

Balancing Ways, Roto Checkers, Hand and Power Scrapers, Spotters, Hand and Power Hydraulic Straightening Presses

years; and **Samuel Phipps**, salesman, St. Louis district, after 35 years of service. **George H. Dennison** was promoted from assistant to Buffalo district sales manager; **William G. Kettner, Jr.**, from assistant to office manager for the N. Y. sales district. The following transfers were made. **C. R. Strong**, salesman, from Wisconsin to Peoria, Ill.; **F. H. Garske, Jr., A. G. Ott** and **J. H. Spehr** to the Wisconsin territory; **M. I. Johnson** to Buffalo district; **G. A. Tanner** to St. Louis; **H. A. Johnson** to South Texas; **S. E. H. France** to New York; **H. W. McGarr** to Chicago; and **R. D. Hulben** to the DesMoines-Davenport territory.

The Cleco Div. of the Reed Roller Bit Co., Houston, Texas, has announced the appointment of La Grand Industrial Supply Co., Portland, Ore.; The Sidney B. Roby Co., Rochester, N. Y.; and Fehrs Tractor and Equipment Co., Inc., Omaha, Nebraska, as distributors for Cleco products in their areas.

Oscar E. Schlichter, 1875-1953

Oscar E. Schlichter, founder of the Hamilton Tool Co., Hamilton, Ohio, died at Denver, Colo., June 10, at the age of 78.

He was a native of Germany, widely known in the machine tool field.

Sumner Simpson, 1874-1953

Sumner Simpson, 79, board chairman of Raybestos-Manhattan, Inc., died June 13 at Bridgeport, Conn.

He started in the automotive business early in the century with Royal Equipment Co., which soon became Raybestos. Influential in the merger in 1929 which resulted in Raybestos-Manhattan, Inc., he was its only president until a few years ago.

L. D. Rigdon, 1886-1953

L. D. Rigdon, consultant to the manufacturing vice-president of Westinghouse Electric Corp., died suddenly at his home in Pittsburgh May 24. He was 67. Joining Westinghouse in 1909, most of his experience with the company was in an executive capacity in connection with shop methods and equipment.

RUTLAND

SAVE TIME - SAVE MONEY
SAVE TOOLS
For rapid changeover of Tool setups

SPECIAL TOOLS FROM STANDARD TOOLS

All types of special reamers, cutters, end mills and drills can be made from standard catalog tools. We can make these specials to your blueprints quickly and economically from our large stock of standard cutting tools.

Mail your specifications or blueprints today for immediate price and delivery.

Rutland TOOL SERVICE
1617 E. McNICHOLS • DETROIT 3, MICH
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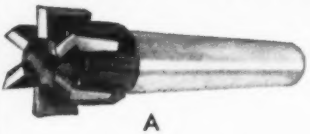
APEX INSERTED-BLADE METAL-CUTTING TOOLS

Milling Cutters Stocked in Over 20 Types



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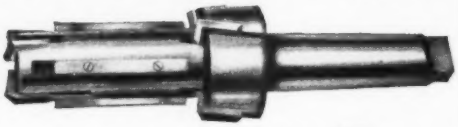
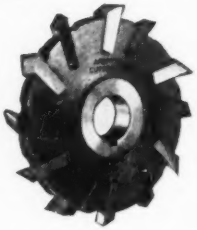


B

(A) END MILL. (B) COMBINATION BORING AND FACING MILL. Both are made with tapered, serrated blades adjustable to hold diameters. (C) ALTERNATE ANGLE CUTTER. Slots all widths ½" and over, and all diameters 4" and larger. Blades of H. S. Steel, Super Cobalt, Stellite or Carbide Tipped. Write for catalog showing complete line of multiple and single-point tool bits, serrated or round shank.



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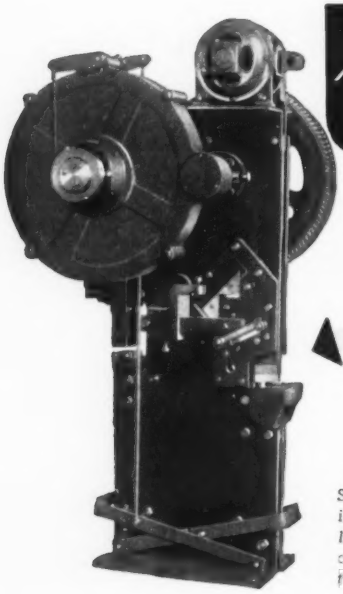
APEX TOOL & CUTTER CO., Inc., Shelton 14, Conn.



Beloit

COMBINATION PUNCH, BAR SHEAR, ANGLE SHEAR and NOTCHER

Here's the ideal equipment for shearing, mitering, notching and coping angles. This model also shears flat and round bars. Punches to the center of 10" without changing the set-up. Versatile. You'll find many jobs for this Beloit machine . . . and the savings will more than pay for it!!

Send for illustrated literature and prices today.

HENDLEY & WHITTEMORE CO.
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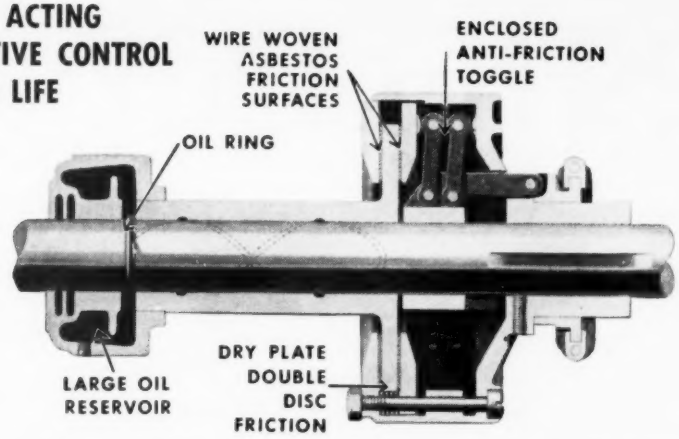
FAST ACTING
POSITIVE CONTROL
LONG LIFE



BROWN
MULE PULL
CLUTCHES

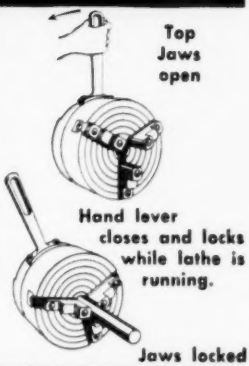
This time-tested clutch provides maximum power transmission at lowest cost. For specifications and prices on wide range of sizes, write for Bulletin No. 25. Brown Engineering Co., 126 N. Third St., Reading, Pa.

Labor Saving Production CHUCK

Will pay for itself in 60 to 90 days

On turrets, engine lathes, cutting-off machines, drill presses or any type of chucking machine, the Barker Two-Jaw or Three-Jaw hand operated chuck will increase production up to one third and actually pay for itself while doing it in from 60 to 90 days. Hand lever eliminates pneumatic and hydraulic systems, yet closes and locks jaws with lathe running or stopped. Over 30 years of labor saving, production boosting operation.

Write for bulletin 201 today.



CHUCK DIVISION
THOMAS HOIST CO.
2 S. HOYNE CHICAGO 12, ILL.

SHELDON

CHICAGO U. S. A.

More will be *profit* with a SHELDON

It actually costs less to do most turning jobs on a Sheldon Precision Lathe. Machine-tool investment is cut to a fraction. Power cost is materially reduced. Less experienced operators can operate Sheldons safely and efficiently. Even cost-loadings for plant—floor space, heat and light are lower because two Sheldons can often operate in the space occupied by one large lathe.

On most "everyday" jobs a Sheldon will actually turn out more pieces per hour too. With double V-belts to the spindle Sheldon lathes deliver enough power to take a healthy bite in direct drive, at really high speeds. Sheldon's "Zero Precision" Taper Roller Bearings permit work to the closest tolerances. Very seldom if ever are such extremely accurate bearings used in other lathes.

You will actually keep more as profit if you use Sheldon Lathes wherever possible.

Write for Catalog

SHELDON MACHINE CO., Inc. 4242 North Knox Ave., Chicago 41, Illinois

What's New IN METALWORKING

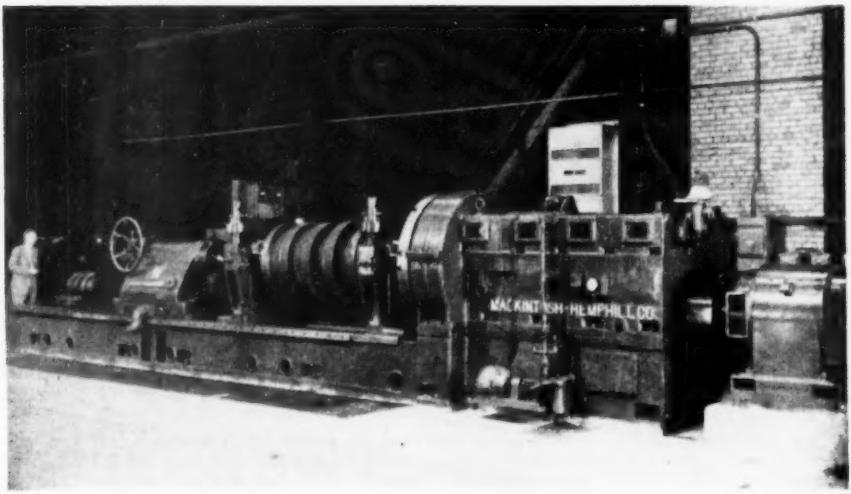
Fully Automatic Contour Duplication

FULLY AUTOMATIC contour duplication is claimed to be an accomplished fact on the giant 60-inch roll-turning lathe announced by Mackintosh-Hemphill Co., Dept. BB, 901 Bingham St., Pittsburgh 3, Pa. All-electronic duplicating equipment is used to control the tool's cutting action.

The lathe is used to generate on huge steel mill rolls the complex body outlines which produce beams, channels, ship sections and other rolled steel products. Deep and narrow grooves, such as a closed flange, necessarily must be cut using tools specially adapted to this work.

A major advantage of the lathe is the extreme flexibility of its control system and the ease of maintaining the electronic duplicating equipment. Push-button manual control of all motor-driven tool feeds permits fast roughing of individual passes, and rapid automatic roll finishing.

The duplicating device guides the motion of the cutting tool from a flat template whose contours are exactly those of the roll to be machined in the



lathe. A minutely varying degree of angular deflection in a floating tracer stylus moving along the edge of a template is signalled to a control panel.

These signals are electronically amplified, interpreted and fed to two electric motors. The motors' combined action in response to the signals keeps the stylus traveling and hugging the template. Since the cutting tool is mounted on the same movable part of the lathe carriage as the stylus, tool travel duplicates the path of the stylus. Tool deflection presents no problem when taking heavy rough cuts. Compensation can be made for tool deflection during lighter, finishing cuts.

Once a job is set up, the lathe operates with a minimum of operator supervision, duplicating on the roll the contours of the guiding template.

Present roll shop practice on the new Mackintosh lathe calls for surface speeds of about 60 feet per minute on iron and 200 feet per minute on steel. Additional time and labor are saved by a continuous chip disposal conveyor which discharges into easily removable buckets in pits at the end of the lathe bed.

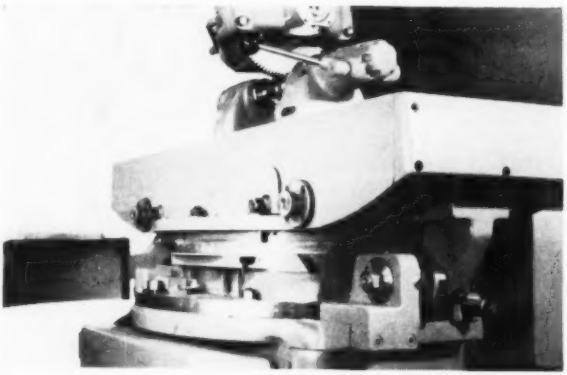
Machining rolls, which may weigh up to 36 tons, can present difficult mounting problems. Some of these are solved by mounting the roll solidly in roll housings. Mounted on the lathe bed, the heavy, completely adjustable housings are said to duplicate actual rolling mill conditions and give stability to the rolls being machined, without turning on centers.

The lathe can accommodate rolls up to 54 inches in diameter and 20 feet long. Neck diameters from 11 inches to 28 inches can be handled in the roll housings.

Over-all lathe length is 45 feet and bed width is 65 inches. Face plate is 5 feet in diameter; headstock length, 9 feet; carriage length on the bed is 6 feet. Main motor is a 75 h.p. unit.

Conventional crowning with diagonal shaving machine

Gear tooth crowning by the conventional method of rocking the machine table during the shaving cycle is a feature that has just been added to the Red Ring Model GCU shaving machine, by a new redesign, by National Broach & Machine Co., Dept. BB, 5600 St. Jean Ave., Detroit 13, Mich.



Heretofore, crowning on this machine required a specially formed cutter, but now it can be done with any standard rotary cutter while the work gear is being reciprocated in line with its axis.

The rocking action of the table is accomplished by means of a central pivot and a cam which causes each end of the table to rise slightly as the end of the cutting stroke is approached.

The table has also been made considerably more rigid and the crowning cam located on table centerline to avoid any tendency to twist.

The point of maximum crown, although usually at the center of the tooth may be shifted either way by

changing the position of the work gear with reference to that of the cutter. The amount of crown is a function of the cam adjustment.

When it is desired to shave gear teeth, spur or helical without a crown, the crowning cam is disengaged. The table then remains horizontal throughout its stroke.

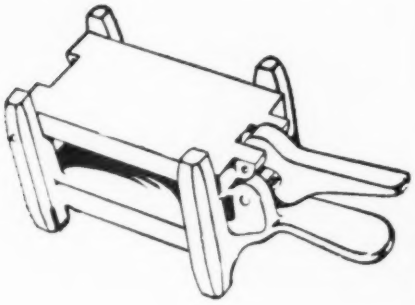
The pivoted table also offers the possibility of shaving gear teeth to a predetermined taper. In this case the table is set at the desired angle and locked. Shaving then proceeds on the conventional cycle.

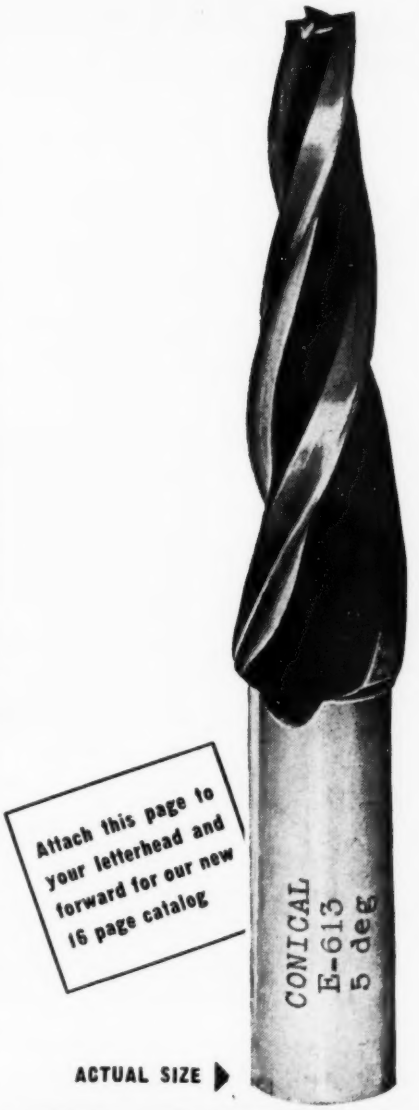
As optional equipment the recently announced differential up-feed mechanism may be incorporated with this machine. This provides automatic precision up-feed in selected increments throughout the shaving cycle and automatic return to proper backlash position at the end of the cycle. Any number of cutting strokes may be used, each with its own increment of feed and any number of idling strokes, all automatically controlled.

Parlec drill jigs

Lower initial cost, top performance and less designing and tooling time are some of the main features claimed for the Parlec jigs made by Universal Tool Co., of Hawthorne, Calif., and distributed by Franklin E. Smith & Associates, Dept. BB, 4349 E. Slauson Blvd.

The jigs are constructed of nickel iron and normalized. In the universal Parlec jigs, tool designing time is greatly reduced by using full scale layouts furnished for each size jig. The





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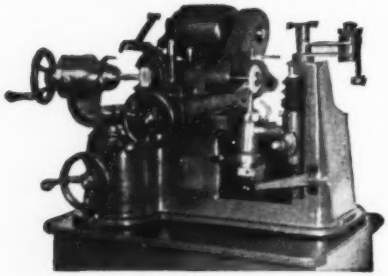
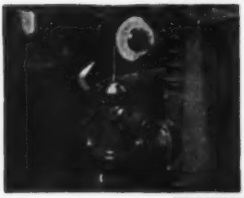


MODEL 1100

CHAMFER Sharpening



FLUTE Sharpening

GUN POINT Sharpening

• Capacities No. 0 Machine Screw to 1½" Hand Taps.

HENRY P. BOGGIS & CO.
710 East 163rd Street
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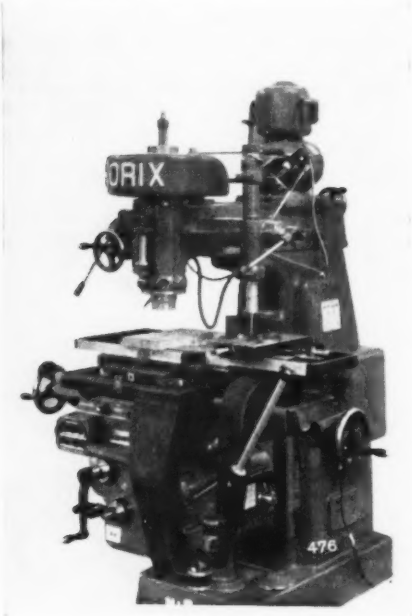
toolmaker locates the part on the base, adds side plates if drilling sides, installs bushings and clamps.

With the jigs for round stock, the user merely adds necessary bushings, sets equalizing clamp by setting lock nuts for size pieces to be drilled and sets adjustable stop furnished with the jig. Where the piece to be drilled is shorter than the jig body length, a stop can be added by installing pin in jig body where required. Where a longer stop than one furnished with jig is required, standard diameter bar stock to obtain the necessary length can be used. Three sizes of the round stock drill jigs will take any job from ¼" to 2" dia.

High speed ram type vertical miller

This vertical miller, the Horix, distributed by United Machinery Sales Co., Dept. BB, 4412 N. Ashland Ave., Chicago 40, Ill., is said to be designed for toolroom experimental work as well as light, high precision production. Fea-



tures claimed are accuracy combined with smooth finish and easy operation.

Operating to capacity, cutters up to 1½" dia. in steel and larger hard alloy cutters in softer materials are employed. The machine incorporates longitudinal travel of table, cross travel of saddle and vertical travel of knee, all equipped with power and power rapid traverse movements.

The machine is provided for longitudinal traverse and vertical power rapid traverse. Engagement of rapid traverse is by lever at the front of the knee.

Swanson turret indexing units

Standard, intermittent-motion turret indexing units, said to provide a basic "packaged" chassis for a wide variety of special automatic machines, have been announced by Swanson Tool & Machine Products, Inc., Dept. BB, Erie, Pa.

They are claimed to eliminate part of the engineering time and cost required in designing special machines for light

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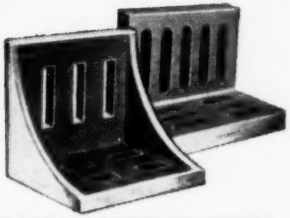

Eclipse Angle Plates are available in "Webbed End" and "Open End" patterns. Made from high quality castings and seasoned before machining to prevent distortion. All faces of Open End and outside faces and edges of Webbed End patterns are machined square and parallel.

Webbed	Cost	Length	1st Angle	2nd Angle	Open End	Cost
#199	2.50	3"	2½"	2"	—	—
#200	3.25	3½"	3"	2½"	—	—
#201	4.25	4½"	3½"	3"	#301	5.50
#202	5.50	6"	5"	4½"	#302	7.75
#203	7.00	7"	5½"	5½"	#303	9.25
#204	9.00	8"	6"	5"	#304	11.50
#205	11.50	9"	7"	6"	#305	14.50
#206	17.00	10"	8"	6"	#306	18.50
#207	22.00	12"	9"	8"	#307	24.00

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Write for Manual B-8

ZAGAR TOOL, Inc., 24000 Lakeland Blvd. Cleveland 23, O.

Zagar TOOLS For INDUSTRY and SPECIAL MACHINERY

manufacturing operations on small and medium parts. The units also advance the completion schedules of special machines because of the saving in shop time gained through the use of the standard chassis, says the manufacturer.

They are offered with turret diameters of 20", 30" or 40", for mounting 16, 24 or 32 work stations. Indexing rates are from 547 to 4,700 indexes per hour and dwell time may vary from .5 seconds to 4.9 seconds.

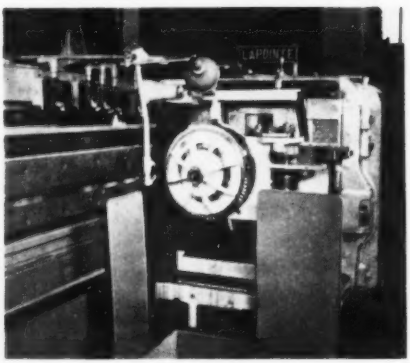
Harmonious indexing is accomplished by means of a uniform acceleration cross-over cam. A locking device is said to assure positive and accurate location at all work stations.

A mounting ring with radial keyway is provided below the face of the turret for fastening mounting brackets. These brackets may be fastened in any position around the turret, and are furnished in a variety of widths to support any type of operational device. The stationary center plate, recessed in the top of the turret, provides an additional means of mounting or supporting operational devices. Floor base plates can also be furnished for mounting larger apparatus.

A totally enclosed fabricated steel base supports the index box and turret and encloses the motor drive.

High-speed broaching machine

Public acceptance of their electro-mechanical-drive horizontal broaching machine is reported by J. P. Crosby, vice-president of the Lapointe Machine



Tool Co., Dept. BB, Hudson, Mass.

Broaching speeds up to 300 f.p.m. and more are said to provide increased production and it is claimed that the machine produces a better finish while at the same time providing greater accuracy through freer cutting action.

Carbide-tooth broaches can be used at these high speeds, and it is possible, the company states, to broach jobs that heretofore were impossible.

Optional features are patented dual speed and dual cycle. The dual speed feature permits the machine to be operated at two or more predetermined speeds for the same broaching stroke. Dual cycle has been designed for the broaching of jet engine components without tool changeovers. Limit switches for operating these dual speed and dual cycle features are shown in the accompanying photograph.

Two slide widths are offered, 16" and 24", with strokes up to 180 inches. Drives up to 200 h.p. can be had, depending on the speed desired and the amount of material to be removed.

The company claims that the need for skilled operators has been substantially reduced, due to such features as the simplified electric controls. These are flexible for setting-up purposes, and have a locking attachment to prevent damage to machine, tools or operator when automatic cycle is used. Cutters are at eye level and can be examined at any time; maintenance is said to be simplified because everything is accessible; the machine is fitted for hoist attachment.

New line of slitting saws developed

The Nelco Tool Co., Manchester, Conn., announces a new line of slitting saws featuring heavily reinforced bodies claimed to end shearing during stresses and prevent shattering at high operating speeds. The alloy steel bodies, built out to the width of the teeth to minimize vibration, assure true running and provide finer finishes to closer tolerances.

SPECIAL PURPOSE

Micrometers

TUMICO Blade Micrometer—*Shown at right* —Measures narrow depth grooves, slots, keyways, splines, square threads and similar surfaces. Blade thickness .030". Hardened, ground, lapped.

Other Tumico special purpose micrometers are made in a wide range of styles and sizes. Specially shaped mandrels measure lands, ribs, threads, extrusions, tubes, rounds, and other shapes and surfaces that are difficult to reach and gage.

Special purpose Tumico tools not only measure precisely but speed production and inspection. Tumico catalog No. 22 shows many of these tools. Write today.

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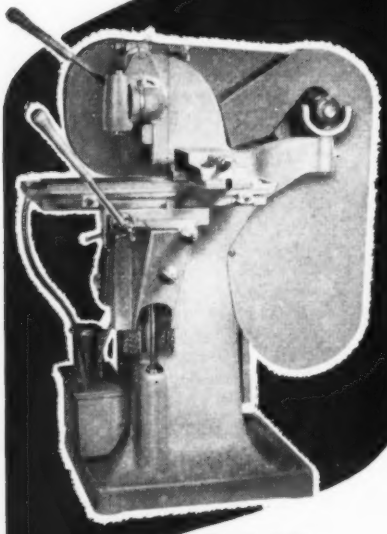

SEND FOR DATA AND SUGGESTIONS

Suggestions as to how a U. S. No. 1 Milling Machine can cut costs on your particular production needs, as well as complete data on the basic machine and attachments, gladly furnished on request.

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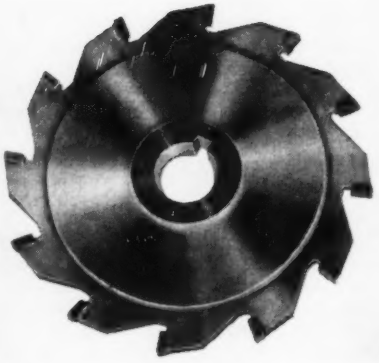
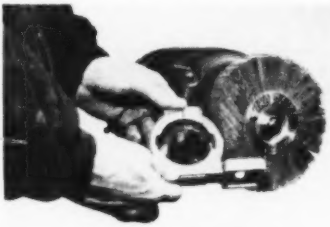


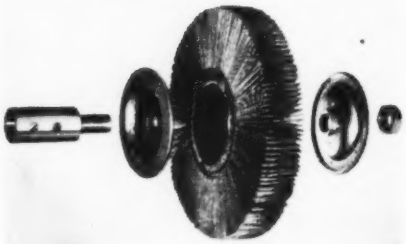
the manufacturer claims.

Saws retain Nelco design feature of overhanging carbide tips, which is said to eliminate grinding both steel and carbide in resharpening. Full side chip clearance is claimed to assure cooler operation and score-free finishes. Saws are color coded for ease of identification by an electroplating process.

New flexible grinding wheel

A new principle for light grinding and metal finishing is being introduced by Merit Products, Inc., Culver City, Calif. The tool, known as Grind-O-Flex, is a





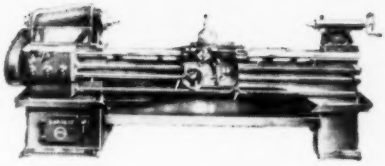
flexible grinding wheel which consists of hundreds of individual abrasive cloth leaves sealed to a hard core. As the wheel rotates it presents a continuous abrasive surface to metal parts. It is designed to smooth surfaces and remove flaws from contours without the danger of digging into the stock.

The wheel is 6½ inches in dia., one inch wide and is available in a variety of grits from coarse to very fine. It may be used stationary or portably for all types of light grinding and deburring on irregular surfaces. A mounting arbor is provided for attaching the wheel to any standard plain or threaded shaft or for chucking in ¼" or ½" chucks.

Simplex 20" lathe

A new Simplex 20" lathe is announced by Morey Machinery Co., Inc., Dept. BB, 410 Broome St., New York 13, N.Y. It is said to incorporate several new features and to be especially valuable for accurate job shop work.

Relatively heavy, the structure of the



bed and units "checks out" to recognized precise standards of accuracy. Spindle is hardened and ground with American standard spindle nose. The lead-screw is ground, with split nut and no backlash. Especially helpful is the gap bed feature, which swings to 30" and is of removable block type, and reinforced. The Norton gear box is fitted with spline shafts and incorporates the shear-pin type safety device giving a full range both of American and metric standard threads.

The 20" Simplex is obtainable in two sizes, 60" and 78" distance between centers.

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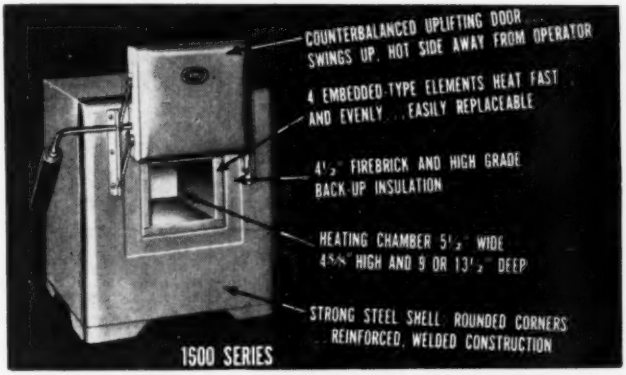
with versatile Temco bench-type furnace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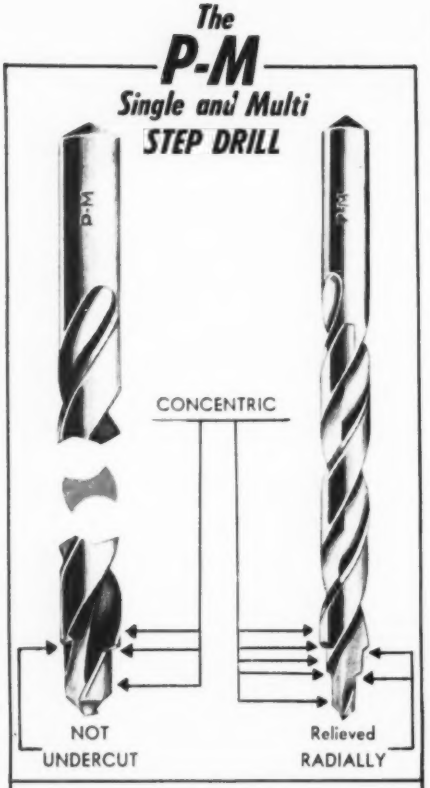

Types of Single Operations Possible with Multiple-Diameter Drills

All of the types of holes shown in the illustration, and many others, often can be produced in a single operation by Multiple-Diameter Drills.

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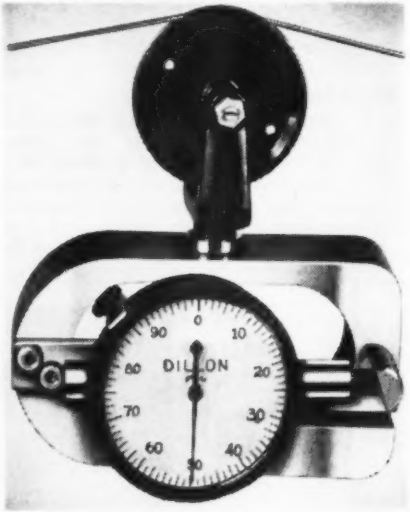
Mechanical pressure gage

An addition to the line of mechanical pressure gages of W. C. Dillon & Co., Inc., Dept. BB, 14620 Keswick St., Van Nuys, Calif., is a model that is designed to measure the amount of tension in a moving or stationary cable, plastic filament, yarn, paper, twine, etc. Readings are taken directly in pounds by means of a jewelled dial indicator.

In operation, the object to be measured passes over a ball-bearing sheave or roller. This sheave is mounted in a



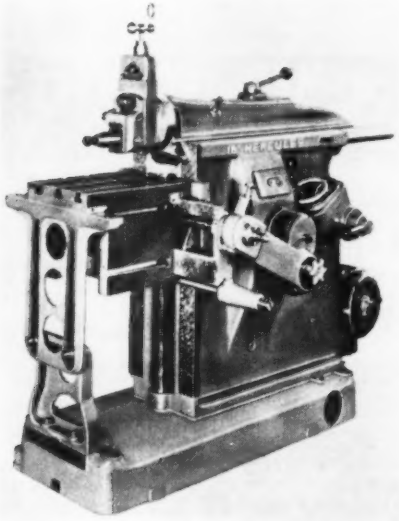
yoke which is screwed to the "U" shaped pressure bar of the instrument. The bar itself is of heat treated alloy steel. Under downward pressure of the moving filament, it deflects only .039" for a full scale reading. Accuracy is guaranteed to within 1% of the indicated reading.

Common conception of pressure gages is that they all operate by means of steam, oil, air or gas pressure only. The Dillon instrument is a distinct departure from this being 100% mechanical and designed to measure mechanical forces existing between air vise jaws, clamps, hydraulic platens, rollers, spot welder electrodes, etc. The largest model measures only $4\frac{3}{4}$"x$2\frac{1}{8}$"x$3\frac{1}{8}$".

A threaded mounting hole is provided in the bottom half of the "U" shaped pressure bar so that it can be mounted in special fixtures. Reasonable overloads do not harm calibration, and a maximum pointer is available optionally. They can provide this unit in 10, 25, 50, 100, 250, 500, 1000, 2500 or 5000 pound capacities. Shockless versions are also offered.

High speed shapers

The new Hercules shapers with v-ram and 16" stroke are high speed machines, designed and built to meet the most exacting requirements of modern machine shop practice and equally well-suited to production or to tool room work, according to the Parker Machine

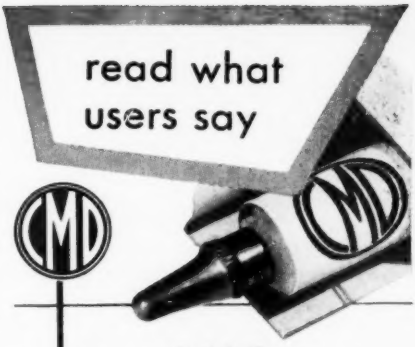


Co., Inc., 158 Pioneer St., Dept. BB, Brooklyn 31, New York.

There is automatic pressure lubrication to the gear box, bull gear main bearing, rocker arm slide block and ram guide ways.

Surface of the work table is 15½" x 10½". The cutting speed indicator has 6 speeds, or 26-152 strokes per minute. Standard equipment includes 7" swivel vise with jaw opening of 8", and v-belt motor drive.

read what users say



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Among technical men all over the country, CMD has become the standard for extreme pressure, anti-scoring lubrication. These men have found that they can get more efficient lubrication for a longer time . . . and get longer life out of their equipment too. People who have used and tested CMD are your best proof of its reliability.

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Engineering Consultant

"Some time ago you very kindly sent to us some samples of your CMD Center Point Lubricants. These have been carefully tested in a number of applications besides the lubricating of centers, and we are pleased to say that the results have been very satisfactory even in cases where other well known high pressure lubricants have failed in a very short time."

University Dept. of Physics

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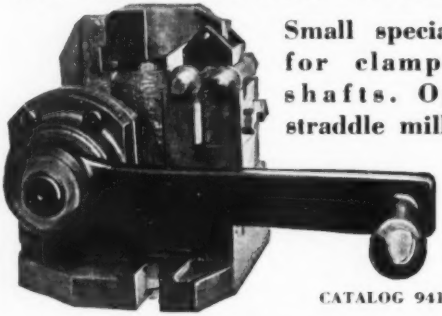

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Firth Brown Tools Ltd.
Galt, Ontario

Twinarc welding

A new development in the application of hidden arc or submerged arc welding, announced by The Lincoln Electric Co., Dept. BB, Cleveland, Ohio, is said to increase the speed of automatic welding from 50 per cent up. Twinarc welding employs two small electrodes in place of a single larger electrode. The two electrodes are fed simultaneously through a single head and a single jaw. Both electrodes deposit metal in the weld crater. The higher currents possible with two electrodes increase the rate of metal deposition, amount of penetration and, consequently, welding speeds.

The method is recommended for use on butt or fillet welds in ¼" or thicker

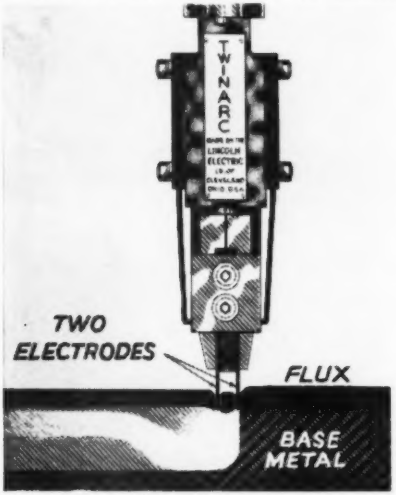


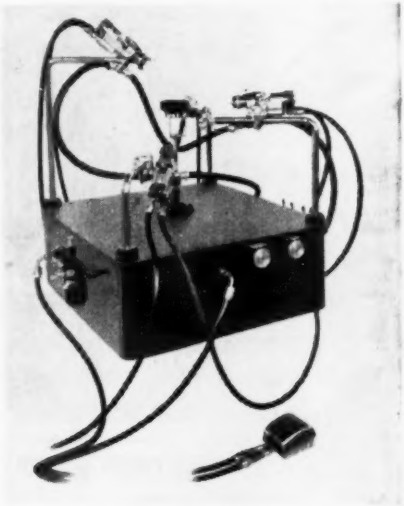
plate where the application is normal for automatic hidden or submerged arc welding. Said to be typical of the speeds possible is that used in making a ¾" fillet weld, 15" per minute at 1500 amperes.

A special electrode jaw, wire feed rolls and wire guides adapt any standard Lincoln weld head for using two electrodes. The standard single head controls are used as well as the standard DC welding current generators. Currents up to 1500 amperes can be used. The two-wire head will feed electrodes in 5/64", 3/32" and 1/8" diameter sizes.

Automatic painting machine

A new, automatic, single spindle painting machine has just been developed by the Conforming Matrix Corp., Dept. BB, 394 Factories Bldg., Toledo 2, Ohio.

It is being produced as a "portable package" which, it is claimed, can be



used in most standard spray exhaust booths. It will be an addition to the full line of automatic spray decorating machines and foot treadle, air operated clamps, fixtures, tools, and electro formed metal masks and mask washing machines now manufactured by Conforming Matrix.

One dial regulates the spindle speed from 100 to 400 r.p.m., while a second dial controls the length of time the spray guns operate. The spindle and guns go into action at the touch of a foot pedal, but stop automatically as predetermined by the dial settings.

The speed of operation is dependent upon the required loading time, which in turn is controlled by the nature of the piece being sprayed and by whether masking devices are employed.

Provision is made for mounting up to four guns, one in each corner as required to cover the work. Even deposition of paint is assured on any job.

Multiple Spindle Magazine Feed Power Screw Driving Machines

Latest type equipment for driving screws faster in products requiring two or more screws. These machines operate easily and require very little attention or adjustment once they are put in production.

Part Feeder

Automatic Part Feeders are adaptable to production jobs requiring the handling of small parts. Parts poured into hopper are arranged and fed down track in proper order. Send sample parts when writing for quotation.

COOK & CHICK CO.
640 SOUTH MILLER ST.
CHICAGO 7, ILLINOIS

Patent applied for

measure PITCH DIAMETER with the *New* SCULLY 3 WIRE HOLDER

NO LOST TIME FUMBLING WITH LOOSE WIRES

The *Scully* **3 Wire Holder** features a coil spring securing the single thread wire. The spring allows the single thread wire to assume the Helix angle of the thread, and to maintain parallelism with the double wires . . . measures up to 3" diameter with standard wires. Each holder has accurately spaced slots for one American Standard pitch only: 32, 28, 27, 24, 20, 18, 16, 14, 13, 12, 11, 10 threads per inch.

ONLY $5.95 DIRECT

Order direct: Individual holder **$5.95** — with wires for measurements within plus or minus .0015 — **$7.95.** Set of 12 holders with Mounting Stand **$60.00** — with wires **$80.00.**

SCULLY MACHINE COMPANY
62 WALTER STREET • BRIDGEPORT 8, CONNECTICUT

D&M AUTOMATIC PRESS GUARD

No Springs •
No Cables •
Fits Any Machine •
Low Initial Cost •
Low Maintenance •

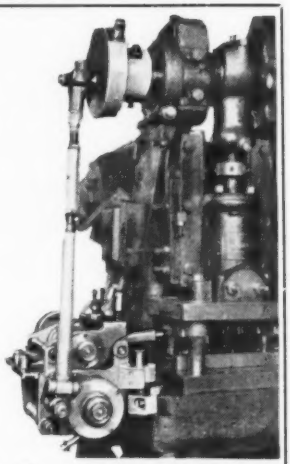
• This punch press guard meets the most exacting standards of safety engineers and safety laws. Permits operator to feed the press without hindrance.

Write for complete information.
Immediate Delivery

D & M GUARD Co.
897 Military Rd. Buffalo, New York

For a complete line of

Q U A L I T Y



ROLL FEEDS

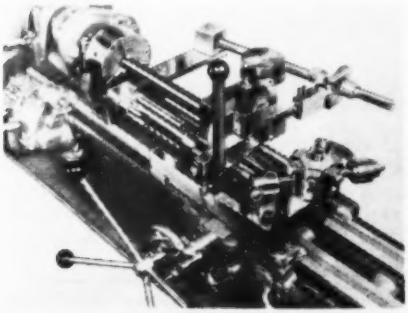
Write today for descriptive literature.

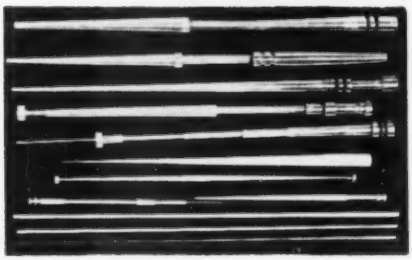
WHYTE ENGINEERING, INC.
185 Rowland St. Springfield, Mass.

Bar stock turning machine attachment

The Karge Turnomat, product of Turnomat Co., Dept. BB, Brockport, N.Y., is said to attach readily to any lathe or other machine tool that rotates stock. Diameters, shapes and tapers can be precision turned to within 0.0002". Maximum bar stock sizes of ¼" to 1/32" can be handled — minimum diameter, 1/32". Finishes to 65 microinches rms are claimed to be produced.

Bar stock is the connecting rotating link between lathe or head stock and spindle of attachment. The Turnomat





spindle is rotated about its own precision bearings by friction caused when spring collet of attachment grips the stock. Since stock, collet and spindle rotate as a single unit, concentricity of cut is assured. It is said to be possible to make deep plunge cuts without chatter, because of proximity of cutting tools to the face of the collet.

Cutting or form tools slide in individual grooves. Built-in taper attachment, which permits turning unlimited tapers and lengths within capacity of

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ON PRODUCTION TOOLING COSTS
WITH
CARDINAL
SPEED VISE
A HUNDRED JIGS IN ONE!
Send for literature...see how SPEED VISE will SAVE on YOUR production costs!
The SPEED VISE exclusive, quick-acting clamping mechanism accommodates a wide variety of parts. DRILL JIGS are simpler, smaller, cheaper when used in a SPEED VISE.
CARDINAL MACHINE COMPANY
GLENDALE, CALIFORNIA

machine, is optional equipment provided. According to the manufacturer, the six-position turret attachment enables operator to perform centering, reaming, tapping and threading operations. Lower part of photograph shows typical shapes that can be produced.

Roller skid supported by compression

The Multiton roller skid, a new product for materials handling, has been developed by Stokvis Edera & Co., Inc., Dept. BB, 95 Madison Ave., New York 16, N. Y.

Basically a heavy duty dolly working on the self-laying track principle, it moves in the same way as a tractor or a tank.

Consisting of a hardened cast alloy steel frame with hardened roller forming the tank track and antifriction ball bearings between rollers, it is said to be able to support heavy weights and move them easily over concrete and other hard floors.

The load carrying capacity of the Multiton is due to its basic design, which allows the load to be almost entirely supported by compression, thus eliminating unsupported overhang. It will

support 3200 times its own weight, say the manufacturers.

A combination of three or more roller skids will accommodate any size or shape of machine, it is claimed. It can then be moved in the direction desired either by hand or power as required.

Nicholson Air-Gas-Steam Traps

NEVER NEED PRIME

Nicholson weight-operated traps, under no condition, leak medium from a power transmission system. This prevents the costly loss of air, gas or steam occurring when inverted bucket traps lose their prime. Under such conditions Nicholson traps hold tight because they do not depend on buoyancy of float to raise valve. Three types; pressures to 1500 lbs.

117 Oregon St., Wilkes-Barre, Pa.

CAT'G. 751

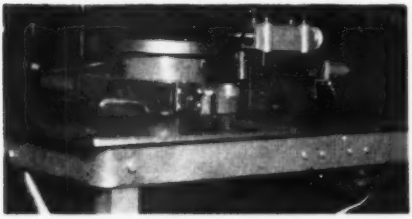
W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS

Dial table has positive index plate

A new dial table announced by G. & H. Mfg. Co., 327 Elm St., Fitchburg, Mass., has a table support that comes to within an inch of the outside diameter of the table. A plunger is used to stop and position the plate on every index.

It can also be used to index uneven



spaces that are in division of fifteen degrees; i.e., it is possible to index 15°, 30°, 45°, 60°, 180°, and then 300° for a complete revolution of the index plate.

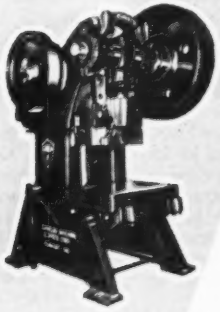
It is said that there is no possibility of the table creeping or shifting position after index has been completed, as the plunger falls into a tapered slot that has a tendency to center itself as plunger is spring loaded and is tapered to fit taper of index plate.

The index positions are set by removing or relocating the block-out screws which are ground to the same diameter as index plate; table stops rotating at first open position that comes along.

Feeding more than one steel sheet into press eliminated with separator

Using automatic steel separators on the roll feed to the press, stacks of steel sheets automatically fan out at the end permitting the operator to easily grasp the top sheet and feed into the press. They are produced by Basco Mfg. Co., Dept. BB, 5 Woodside St., Stamford, Conn.

A Basco unit comprises a permanent magnet that induces a magnetic field in the stacked steel sheets which tend to repel each other causing the ends



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for SPEED POWER ACCURACY

the HYDRA-SHEAR

Will increase your production to a new high. Will shear mild steel up to 10 gauge in three lengths: 6, 8 & 10 ft. Less curl and burring. No gears or clutch.

- Non-Repeating Safety Clutch
- Double Spring Activated
- Unusual Versatility
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- Ample Power
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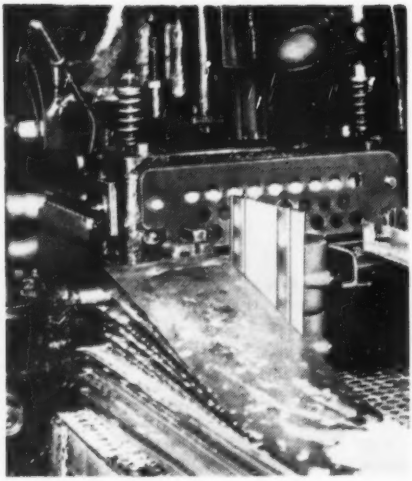
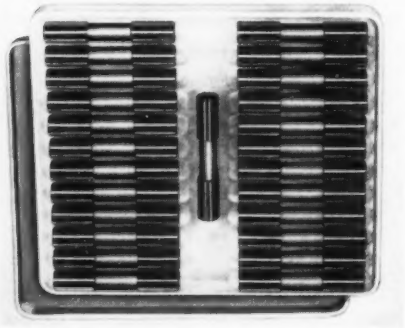
Johnson MACHINE and PRESS CORP.
620 W. Indiana Ave. • Elkhart, Ind.



of the sheets to fan out with air space between them. No matter what substance appears on the steel or amount of grease covering, they cannot stick together.

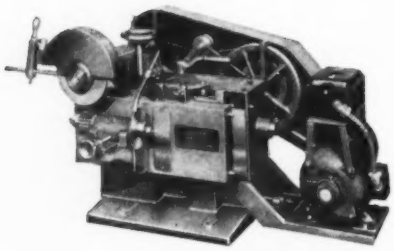
Plug gage set of standardized design

A new system of precision gaging has been announced by Deltronic Corp., Dept. BB, 9010 Bellanca Ave., Los



Angeles 45, Calif., which consists of a 25-gage set; one gage of nominal size, 12 gages increasingly larger in .0001 increments, and 12 gages increasingly

RESTORES BROKEN SAW TEETH AND SHARPENS THEM in GANGS



Saws can be ganged up, 100 saws at one setting and ground at one time. The 35T Automatic Metal Saw Grinder reclaims them and adds many extra hours of useful life. The saw is fed to the grinder automatically at the rate of 30 teeth to the minute. Grinding is indexed automatically and is accurate to ± .001".

WRITE FOR BULLETIN 35T

WARDWELL

Maker of largest line of saw and tool sharpening machines

THE WARDWELL MFG. CO.

3165 Fulton Road Cleveland 9, Ohio

smaller in .0001 increments.

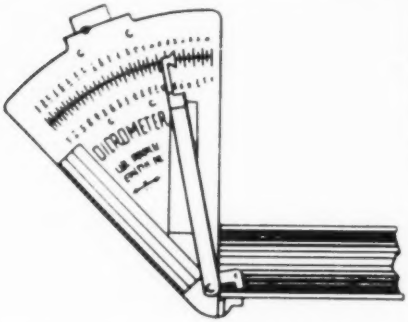
By standardizing plug gage design in this way, purchase of special plug gages for each new application is said to have become unnecessary. The gages are being used as both work gages and inspection gages, thus insuring closer production tolerances and uniform inspection standards, says the manufacturer.

They can also serve as layout pins: the .0001 variation assures a snug fit in bores. Every gage is identified and is the same size on both ends. Set comes in plastic case and is available in any nominal size from ⅛" to 1", in increments of 1/64's.

Measures tube wall thickness to .001

Made by LNL Products, Inc., Dept. BB, 1134 Hinman Ave., Evanston, Ill., the Dicrometer gage is said to check thickness of metal, wood, plastic, glass, paper or textile to within .001 at .250.

The instrument's contact is placed flat against wall of tube or pipe, and the



pointer will show wall thickness in thousandths. For determining gage of wall thickness, operator checks left hand column.

Made from No. 430 stainless steel, the Dicrometer weighs only 4 oz.; useful for measurements in small places.

Better surface finish claimed for German machine

Announcement is made by Rene Boas and Associates, Dept. BB, 92 Liberty St., New York 6, N. Y., of the Kampf die-sinking machine FK/2a.

Vertical suspension of the pantograph

Write for catalog.

● Adjustable to 0.0002-inch, the new improved MASTUR boring tools feature precision, speed and long service life. New body and block construction permits these tools to take heavier cuts at higher speeds — to do more work in less time.

Adjusting-screw head is graduated into 50 divisions to provide readings in thousandths, and body is graduated to permit vernier readings of 0.0002-inch. The three models available have maximum boring bar capacities of 1/2, 3/4 and 1-inch and boring range from 3/8 to 15 inches.

988-MC

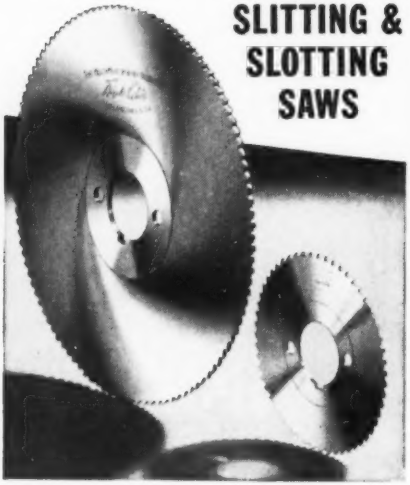
THE MAXWELL COMPANY

220 Broadway • Bedford, Ohio

NO CLOGGING—
NO BINDING—

with MOTCH & MERRYWEATHER Triple-Chip

SLITTING & SLOTTING SAWS



The Motch & Merryweather Triple-Chip Method clears the way to faster results in milling operations. Alternately ground paired high and low blade teeth form curling, self-clearing chips which relieve stresses and minimize breakage. Saws produce more work and more accurate work and "live longer".

* * *

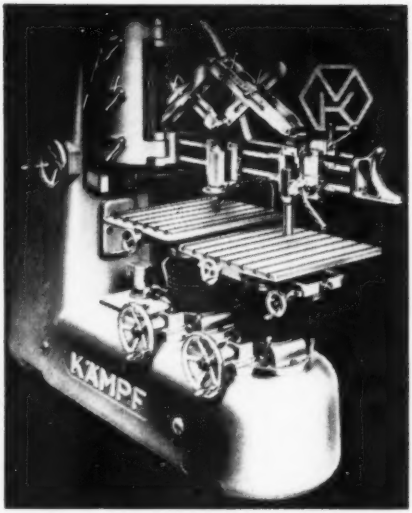
THE MOTCH & MERRYWEATHER MACHINERY CO.

715 PENTON BUILDING
CLEVELAND 13, OHIO

Triple-Chip METHOD

REMEMBER—IT'S THE COST PER CUT THAT COUNTS!

Only TK a TM builds ALL 3:



with accurate vertical control of the milling spindle and the tracer, fixed on a solid swivable arm, is said to absorb much of the strain, thus sparing the no-tolerance pantograph rotation axis and eliminating most vibration of the milling spindle. The company claims this results in greater stock removal capacity, plus better surface finish and a higher degree of accuracy in the finished work.

The arm of model FK/2a is fixed in a rest casing that is adjustable as to height. This enables clamping work that is relatively bulky. Because of the direct manual operation of FK/2a, continuous tracing of the forms is possible.

BK4 process for sintered carbides

A new hardening development known as the BK4 process, on which patents have been applied for, is showing unusual promise according to Harwil Ventures, Dept. BB, 2746 W. 59th St., Chicago 29, Ill.

The process does not just put a case hardening effect on the carbide, it is claimed, but penetrates the entire volume. Although the abrasive resistance of the carbide is greatly increased, the

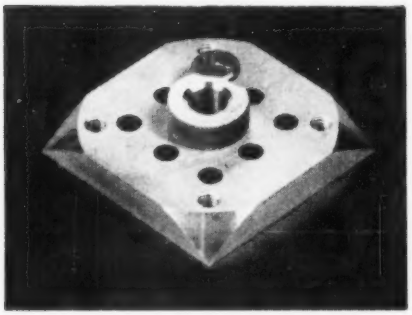
Rockwell hardness does not change.

Subsequent brazing or grinding does not alter the qualities, lengthening the tool life considerably.

The process has been applied to various grades of carbide with equal proportionate results in all cases.

New way to locate a true center

Precision center set, product of A and B Supply Co., Dept. BB, 1315 E. Fairchild St., Danville, Ill., is said to facili-



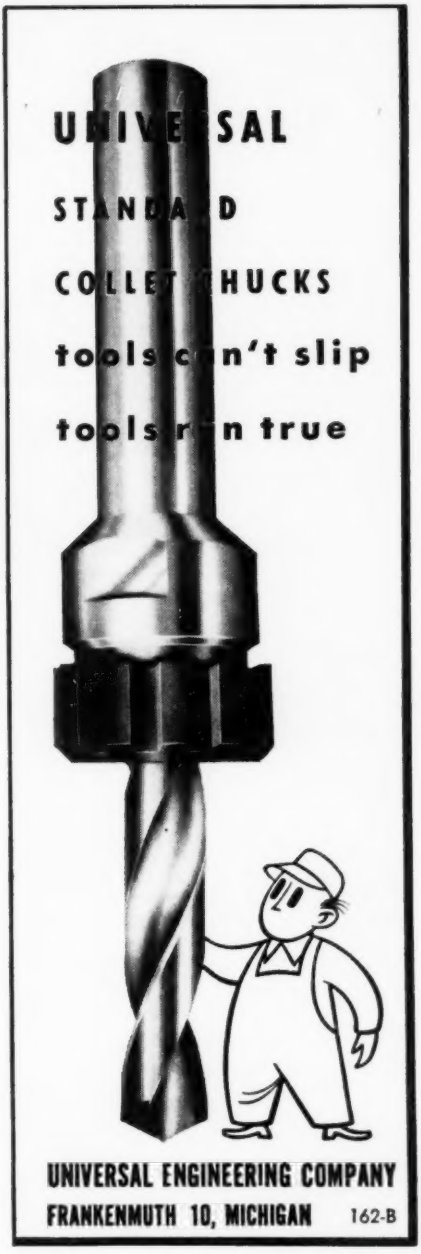
tate the location of a true center. Precision center is placed at 45° so that its corners rest upon and cut off the 90° location lines. It is then secured at this point for true hole position.

More than one precision center can be used at one time in locating multiple holes.

New line for Airelectric

Airelectric Corp., Melrose Park, Ill., has announced a new line of 4-way valves for operation of pneumatic and light hydraulic cylinders. These valves are of D-slide type, with the port-exchanger slide being operated by a double acting cylinder in one series and by a spring return cylinder in another series.

The company claims high durability due to choice of materials in design; the nylon port exchanger has been service tested to 50,000,000 cycles and found to be undamaged, as was the pilot cylinder assembly which is of hard surfaced aluminum. Valves can function without lubrication when application dictates oilless operation. Valves operate on pressures from 3 to 200 pounds.



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And many other jobs

65 Standard styles and sizes

From ¼ to 35 tons pressure for manually operated presses

From 1½ to 30 tons pressure for motor driven hydraulic presses

Originators of the Arbor Press

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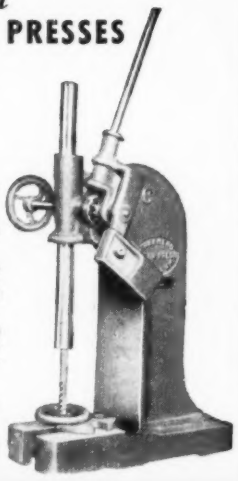


GREENERD ARBOR PRESS CO.
141 CROWN ST. • NASHUA, N.H.

Goodby TO SPINDLE MISALIGNMENT!

On tapping and reaming jobs you'll find that aligning the spindle with the work is made unusually simple if you use a Ziegler Floating Tool Holder — because the Ziegler automatically compensates for inaccuracies of as much as 1/32" radius or 1/16" diameter.

Get a Ziegler Holder and say goodbye to spindle misalignment troubles forever!

W. M. ZIEGLER COMPANY
13570 Auburn, Detroit 23, Mich.

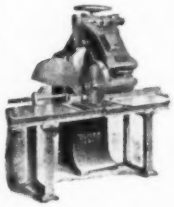
WRITE FOR CATALOG

Ziegler ROLLER DRIVE FLOATING HOLDER for Taps and Reamers...

"Oliver" Cut-off Saw

cuts mouldings, tubes, strips of metal and compositions . . . and accurate to .005 inch!

An excellent production machine that has proved itself in leading plants. Makes straight cuts with saw or cut-off wheel. Self-contained and compact. Operates lightly with no rebound. Fully safeguarded. Cuts thousands of pieces without variation of .005 inch. Built to give years of dependable, smooth operation.

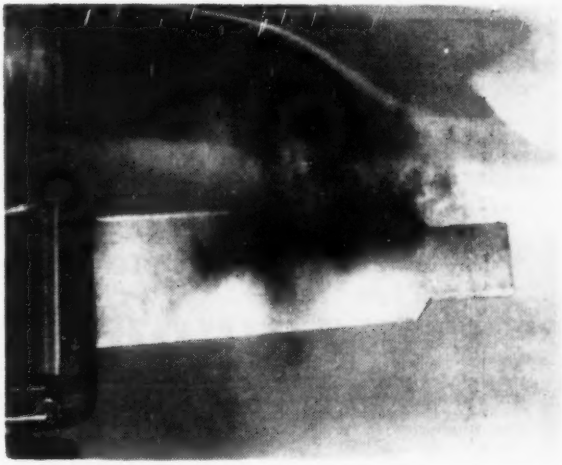


Write for Bulletin 94-DM

OLIVER MACHINERY CO.
GRAND RAPIDS 2, MICHIGAN

Metal cleaning by ultrasonic waves

The Detrex Corp., Dept. BB, Detroit 32, Mich., manufacturer of industrial cleaning equipment and chemicals, has announced the development of an ad-



Foreign matter adhering to the surface of a jet engine blade is shown here as it is almost literally "exploded" away by ultrasonic waves. In this case, the substance is an iron oxide paste which is used to coat the blades to help detect possible flaws and which is extremely difficult to remove by ordinary methods. The element projecting the sound waves in this photo is part of a new ultrasonic process for industrial cleaning developed by the Detrex Corp. of Detroit.

Men who had to "lick" the very problems you're facing designed... ROUSSELLE PRESSES

That's why they're fast, accurate, so adaptable, so easy to operate. Why maintenance is simple. Why initial cost is low . . . Often considerable savings and improved punch press operations are possible if you let our engineering staff assist you. There is no obligation. Simply furnish the details relating to your need or problem and if possible send samples or drawings of the work. You will hear from us promptly.

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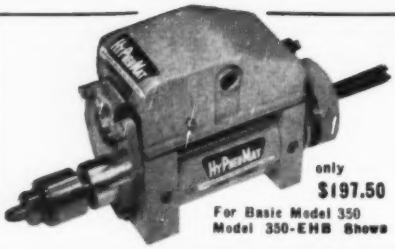

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Model 350-EHB Shown

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HIGH SPEED DRILLING TAPPING UNIT

3.5" Stroke
.375" Drill or Tap Cap. in Steel
May be powered with shop air or low pressure hydraulics.

LOW COST COMPONENTS FOR
HIGH PRODUCTION
DELIVERY FROM STOCK

HYPNEUMAT INC., 647 W. Virginia St., Milwaukee 4, Wisconsin

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TRADE **AUTOM** MARK

Plain Type — **Offset Type**

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All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

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AUTO MOULDING & MFG. CO.
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CHICAGO 19, ILL.

SPECIFICATIONS:
Open width 7/8" to 6"
Gage Material .040 to .123
Pin Diameter .101 to 3/8
Lengths to 120"

SEMI-OFFSET

BOSTON UNIVERSAL ANGLE PLATE

A Precision Tool that Holds Work at Any Desired Angle.

Puts Speed and Profit into Angular Drilling, Milling, Planing, Shaping, Grinding

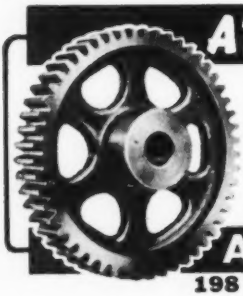
With a Boston Universal Angle Plate on the job, work is quickly set up on the table and but a few seconds are required to locate it at the desired angle. Indispensable in tool rooms and extremely useful in production runs, the Boston Universal pays for itself many times over by eliminating the necessity of expensive jigs and fixtures.

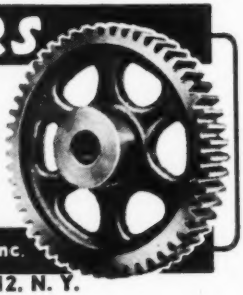
Horizontal motion is 360 degrees; vertical motion, 120 degrees. Fitted with vernier scale reading to 5 minutes.

Made in several stock sizes. Write today for full information.

US AUTOMATIC BOX MACHINERY CO., Inc. 11 ARBORETUM RD. BOSTON 31, MASS.

ATLANTIC GEARS





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ATLANTIC GEAR WORKS Inc.

198 LAFAYETTE STREET • NEW YORK 12, N. Y.

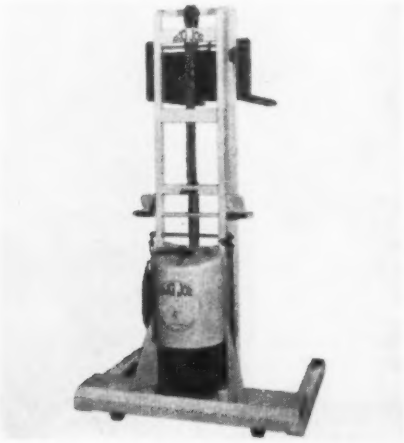
vanced, practical method of metal cleaning through the use of ultrasonic waves.

The new method, known as the Detrex Soniclean process, features a man-made element for directing sound energy—a development which Detrex technicians say opens the door to far-reaching advances in a wide variety of industrial fields.

The use of ultrasonics for cleaning is not a new or revolutionary idea. The element, jointly engineered by Detrex and the Brush Electronic Company, is a curved piece of ceramic resembling a six-inch-long pipe, cut in half along the longitudinal axis. In the process, electrical energy is transmitted to the ceramic transducer, converted into sound energy, and projected through a solvent at a frequency of 430,000 cycles per second. The solvent currently being used in the Soniclean process by Detrex is trichlorethylene; however, the process is not limited entirely to this material. Because a potential of only 40 volts is required to operate the ceramic transducers, they can be safely immersed directly in the solvent.

New models of hydraulic lifts

Several new models of Big Joe hydraulic lifts for either manual or battery operation are currently being introduced by Big Joe Mfg. Co., Dept. BB,



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...BEAUTY IN
Performance

Hollow-ground and bright all over, Reltool End Mills are not only the best looking end mills you ever saw . . . they're proven in performance and cutting efficiency. In addition, they're designed for *easy chip flow* and 10% to 35% longer cutting life. Next time you need End Mills, re-tool with Reltool!

The RELTOOL Line Includes: Combined Drill and Countersinks • Cut-off Blades • Die Sinking Cutters • Dovetail Cutters • End Mills • End Mill Holders • Hollow Mills • Key Seat Cutters • Lathe Centers • Lathe Mandrels • Machine Countersinks • Metal Slitting Saws • Milling Cutters — all types • Screw Slotters • Tool Bits • Specials.

Write for Reltool's net price catalog 53.

Reltool CORPORATION
RELIABLE METAL CUTTING TOOLS
4540 W. BURNHAM ST. • MILWAUKEE 46, WIS.

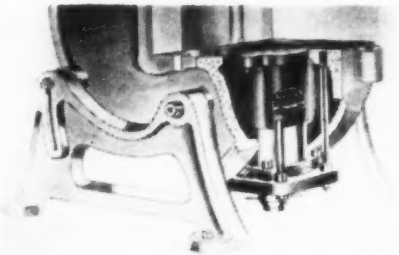
A 7531-½

900 W. Jackson Blvd., Chicago 7, Ill. Among the functional improvements are the following: a straddle type base that can be furnished in a range of widths up to 50"; forks, adjustable in any position to widths that provide the best support for the load, are furnished in lengths from 25" to 36" and load at floor level; swivel casters placed at rear and roller bearing wheels in front, affording maximum maneuverability in minimum space; dual ground gripping brakes, fitted with brake shoes, operated by a single hand lever; a fabricated semi-girder type frame that reduces dead weight while increasing strength and stability; an optional remote control unit on battery models that permits the operator to travel with the load, converting the lift to a portable elevator. These model additions to the regular Big Joe line allow a wider range of selection of lifts in the low price field for simplified handling of varied loads up to 1000 pounds.

Pneumatic die cushion

The Dayton Rogers Mfg. Co., Dept. BB, Minneapolis, Minn., now announces a new model DB full universal pneumatic die cushion.

This new type of installation is primarily designed for inclinable presses. The unit is completely self-contained,



and can be used with or without surge tank.

The internal guiding means has been introduced to compensate for off-center loading of the pin pressure pad (wear plate), which is hardened and ground,

Commander
TAPPER

- Wider Range . . . 1 Tapper Handles No. 0 to ¾" Taps
- Automatic Tap Protection
- Furnished to fit ANY Drill Press

Commander—"The Tapper That Thinks For Its Operator," has the adjustable full range torque control that instantly stops any tap when it becomes dull, loaded, strikes a hard spot or bottoms in blind hole tapping. Assures maximum tap protection, higher production, even with inexperienced operators.

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Any operator does precision tapping with a Commander TAPPER

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4227 W. KINZIE STREET CHICAGO 24, ILL.
Product of Commander . . . Builder of Production Tools

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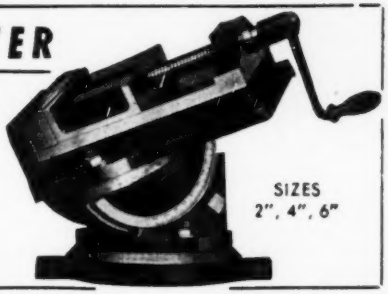
MAKE SET-UPS *FASTER*

Conserve valuable production time by using the fully universal, easily-operated MASTER MULTI-SWIVEL VISE for intricate, angular set-ups in your shop 3 swivels instantly set any compound angle. Used in shops throughout the world. Interchangeable platen optional. Write for circular.



SIZES
2", 4", 6"

DONOVAN MFG. CO.
80 BATTERYMARCH ST. BOSTON, MASS.

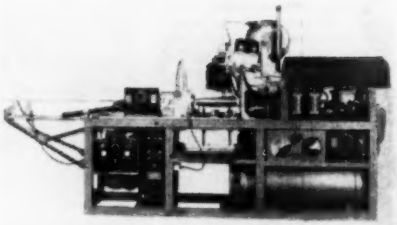
and can be machine-fit to the entire press bed opening.

A combination reducing regulating valve and pressure gage assures constant work pressure on the pin pressure pad at all times, the pressure of which is recorded on the pressure gage.

These pneumatic die cushions are now made in eight sizes from 5" to 18", producing ring holding pressures of 1-ton through 14-ton on 100 lb. airline pressure available. They not only can be used on all deep drawing operations, but can be introduced on pressure pad control on a large percentage of forming dies. They also can be provided for bolster plate mounting.

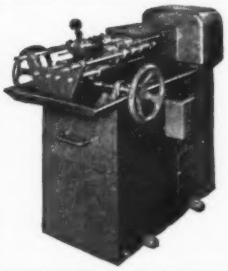
Projectile welding machine

The Model "F" universal welding machine for projectiles has been recently developed by the Morley Machinery Corp., Dept. BB, 1239 University Ave., Rochester, New York. It makes use of a standard welding head which uses a continuously consumable electrode. This head can be easily adjusted with respect to the shell, it is claimed.



A diversity of rotating bands can be applied by either a spiral or index feed of the head while the shell is rotated between self centering chucking adapters. Complete versatility of speeds and feeds is provided. The welding generator is incorporated in the frame of the machine making it an all-inclusive unit.

Compressed air or water cooling of



for rapid threading

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Alternate feeding to two spindles. Continuous operation. Large output. Low Costs. Change-overs made quickly. Minimum skill required.
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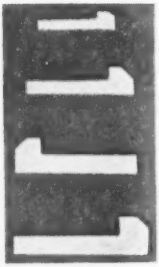

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PRECISION GROUND FROM SOLID!

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WOODSON TOOL CO.
4811 Lennox Blvd. Inglewood, Calif.

the work is provided through a cooling tube synchronized with the welding head. Automatic loading and unloading, after each shell is processed, makes the machine suitable for production line work. The consumable electrode can be of various metals which must conform to the shell specifications. These include iron and copper.

Bakewell tool post and tool holders

Use of the Bakewell master tool post and tool holders, developed by Bakewell Products and now being distributed nationally by them, has resulted in important savings for lathe users. The address is Dept. BB, 1128 Mission St., S. Pasadena, Calif.

The advantages of the unit are said to be its "quick grip—quick release" feature which enables cutting tools to be exchanged quickly.

The bar-type tool holder is held in the tool post by jaws hardened and ground. Rotating the operating handle

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Organization interested in buying such plant for distribution in the United States of America are invited to write to:—

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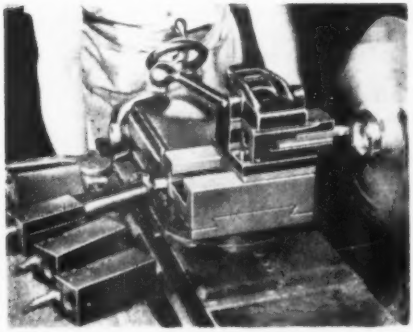
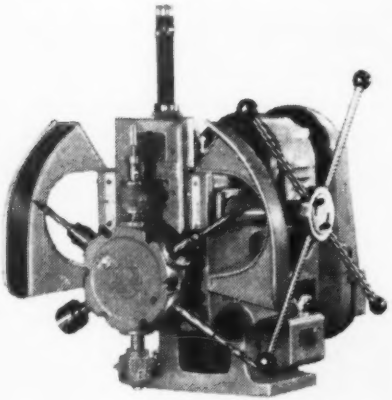
clockwise releases the extreme pressure on the jaws. Further rotating engages a cam which causes the jaws to immediately open fully. This permits quick changing of tool holders. Tightening the tool holder in the tool post is accomplished by a counter-clockwise move-



ment of the operating handle. The cam action causes the jaws to quickly grip the tool holder; thread action then takes over. Ten pounds of pressure on the handle exerts 6200 pounds of jaw pressure on the tool holder.

Model 2B flange mounting machine

Burg Tool Mfg. Co., Dept. BB, 3743 Durango Ave., Los Angeles 34, Calif., announces another adaptation of



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NEW AUTOSET

Self-setting hold-down clamps for presses and machine tools

No packing required—has 3 interrelated contact surfaces. Tools gripped, can't slip. Malleable castings. Washer attached preventing misplacement. All sizes in stock.

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Since 1943—manufacturers of aircraft clips and clamps conforming to latest AN specifications.

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Specifications:

Depth of Jaws	2½"
Vise Opening	13½"
Base Size	12" x 14"
Width of Jaws	11½"
Keys	11/16"
(unless otherwise specified by customer)	
Shipping Weight	270 lbs.
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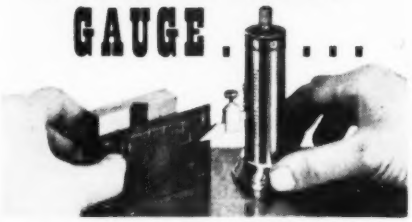

FOR FAST, ACCURATE LAYOUT

A new precision height gauge which reads like a micrometer and measures zero flush at base. Has a direct reading of 2" with scriber in upright position, and 3" with scriber reversed.

Replace scriber with dial indicator and Micro-Height Gauge measures center distances between holes or surfaces. As indispensable as a micrometer to toolmakers, layout men, and inspectors.

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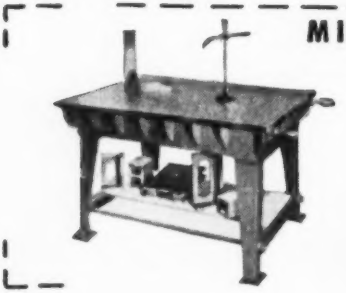

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THE KEYNOTE TO ACCURATE MEASUREMENT

Over forty years of experience gives you "proved" performance — added assurance of quality production. Milwaukee Surface Plates, Angles, Parallels and Straight edges are all made of the highest quality semi-steel and finished to exact dimensions.

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the standard Model 2A machine, the Burgmaster flange mounting Model 2B. This model can be mounted on any type of base, in a variety of positions. It is designed so that 2 or more machines can be mounted on the same base at various angles in order that operations can be performed on different planes at the same time.

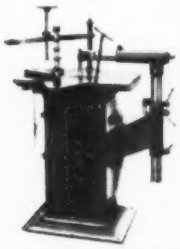
The Burgmaster flange mounting Model 2B is equipped with a separate mounting electrical panel and chain counterweight unit. Model 2B can be secured with an automatic hydraulic feed at request. Spindle speeds, ram travel, feed handles, motor, and other features are the same as the present model 2A.

Monolight speeds inspection with optical flats

Claimed to be the largest monochromatic light generator on the market, The DoAll Company's (Dept. BB, Des Plaines, Ill.,) new "Monolight" features a 20" diameter, high intensity light source. Large parts or large numbers

of smaller parts can be checked more easily and rapidly for surface flatness, finish, dimension, etc.

SUNRAY KEYSEATER



STRAIGHT OR TAPER KEYWAYS
UNIVERSAL CENTERING
NO BUSHINGS OR BUSHING HOLDERS REQUIRED
RUGGED STEEL CONSTRUCTION
A TABLE TYPE FEED
YOUR PRODUCTION MACHINE

Faster and more economical cutting of keyways with SUNRAY. Meets your most exacting requirements. Keyways cut 1/8" to 1" by broach having several teeth cutting at once; also eliminates tendency of cutter to dig into the work. Many other advantages!

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PIONEERS and PACEMAKERS in their line

—head rivets from smallest to 3/8" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—sizes to meet all needs—types include Vertical and Horizontal Multiple Spindles

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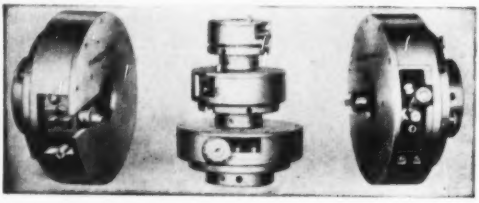

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FACING HEADS

with Automatic Feed

One-way Tool Feed—6, 9 and 10" sizes.

Two-way Tool Feed—9, 12, 16, 20, 24, 30, 36, 40 and 46" sizes.

Save many costly set-ups.

Bulletin No. 4141 Gives Full Details

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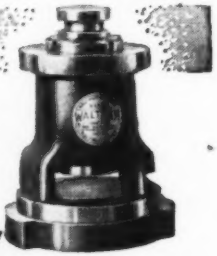
WALTHAM CYLINDRICAL SUB-PRESSES

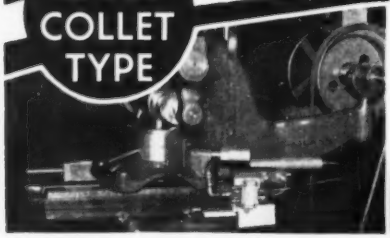
Dies for high precision work should not only be perfectly aligned but provision should be made to maintain that alignment throughout the life of the die. Our bulletin shows how it can be done.



ARCH SUB-PRESS

WALTHAM MACHINE WORKS WALTHAM 54, MASS.

G&H COLLET TYPE INDEXING FIXTURES



Provide faster finishing of multi-machined precision parts. Quick acting for easy set-up and fast indexing on wide variety of machines. Easily mounted at any angle on millers, grinders, shapers, drill presses, etc. Index plates with 24 notches for any multiple of 15°-one plate can be used to give 2, 3, 4, 6, 8, 12 or 24 index positions per revolution. Special plates furnished for particularly complex jobs.

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***Every* Punch Press Operator *Needs* the "Safety" of a**

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Prevents Injury — Saves Glove Costs

Feeds ferrous, non-ferrous strip or sheet . . . faster, safer. Use for stamping, shearing. Right or left hand non-slip fitted grip, self-adjusting. Sturdy, hardened work surfaces. FULLY GUARANTEED.

Write today.
Early delivery.

Dept. M-8

AFFILIATED MACHINE & TOOL COMPANY
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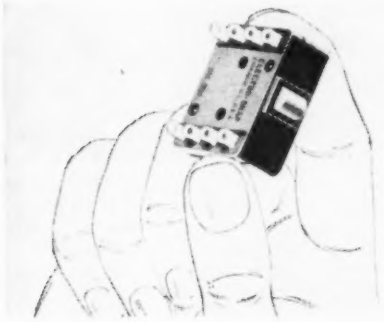
Double pole precision switch

A new switch has been developed by Electro-Snap Switch and Mfg. Co., Dept. BB, 4220 Lake St., Chicago 24, Ill., as an inexpensive answer to switching circuits having two different currents, phases or voltages, but which must be switched at the same time. Because the new double-pole switch is said to simultaneously break or reverse current flow through two wind-



ings of a three-phase motor, it can be used as an inexpensive start-and-stop or limit switch on three-phase machinery. This is but one of many applications where the switch can be used to replace relays or to combine several switching operations into one action. It can operate as many as four separate circuits at one snap.

Dimensions are 1½" x ⅞" x ½". It is rated for 15 amps at 125/250 v AC and 10 amps at 30 v DC.

Production model drill press

A drilling machine designed for multiple operations, involving drilling, tapping, reaming, burring and chamfering, is announced by South Bend Lathe, Dept. BB, 425 E. Madison St., South Bend 22, Ind. Four types, equipped with from one to four drill heads, are available.

Each drill head is essentially South Bend's 14" precision model drill press. A simple belt tension release provides quick speed changes on this model. The free-floating spindle eliminates side thrust and whip and sealed ball bearings simplify maintenance. A built-in

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IMMEDIATE DELIVERY FROM STOCK

3AT, 3C
1A, 4C
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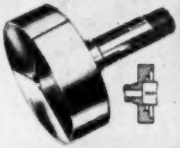

KLUTCH-KOLLET
Step collet for accurate chucking to 2¾" dia. Soft head for easy boring. Lowest price on market! Models 3AT, 3C, 5C.

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(AC-50)

All collets in hexagon, square and round.

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½" cap.

Positive grip on undersize, oversize or standard diameter work! Patented coordinate cams eliminate fingers.

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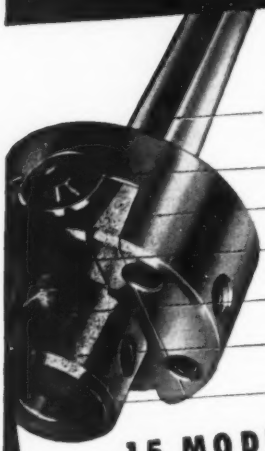

15 MODELS

Flynn has studied boring head applications for many years—builds a size and design for every job with all the wanted features Machinists with real appreciation for quality and precision prefer Flynn.

FLYNN MANUFACTURING CO.

133 Flowerdale
Ferndale 20, Mich.

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FLYNN

work light in each drill head gives good illumination and prevents shadows around the work area. Either a 1/3 or 1/2 h.p. motor may be installed. Approximate spindle speeds range from 720 to 4325 r.p.m. Maximum capacity is 7 inches from spindle to column and 18 inches from chuck to table.

A feature is the drill head positioning attachment. This control unit gives each drill head assembly four inches of vertical adjustment at any one setting.

Mico attachment for electric etching work

A new attachment has been developed that is said to make it possible to easily convert the new Mico engraver so that electric etching work can now be done. This attachment, when used with the other required items of Mico engraving equipment, now makes possible the marking of hardened steel surfaces that

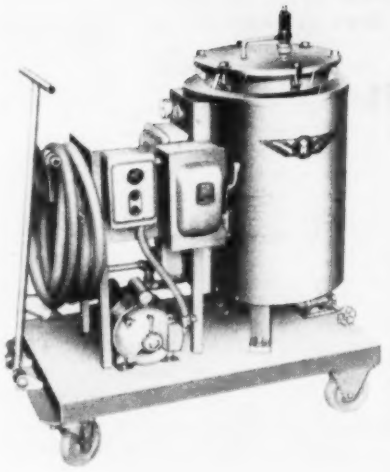
the conventional engraving cutters cannot penetrate. It is made by Mico Instrument Co., Dept. BB, 80 Trowbridge St., Cambridge, Mass.

The electric etching attachment includes its own power source that provides a choice of three output ratings. The rating to be used depends on the hardness of the material being worked on. The tungsten point on the end of the etching spindle is easily replaced when worn and may be ordered as a separate part.

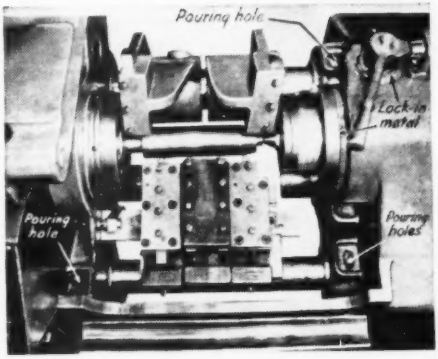
Portable cartridge filter

A portable cartridge filter, that goes wherever hydraulic, quench and other oils need cleaning, has been placed on the market by the Industrial Filtration Division, U.S. Hoffman Machinery Corp. Dept. BB, 219 Lamson Street, Syracuse 6, N.Y.

This new Hoffman unit is designed for one-man handling. Flexible hose, with quick-connecting couplings, permits the operator to hook up to the oil supply of the machine without interrupting its operation. The unit operates on a recirculation basis for such time as is required to fully recondition the oil.



BEARINGS ANCHORED IN CORED HOLES



ELIMINATE MACHINING

Machining time is reduced to a minimum if a special Cerro Alloy is used to anchor shaft bushings and sleeves in cored holes in certain types of machinery.

Bushings are aligned and supported in the cored holes of cast machine frame during assembly on pilot bars held in a fixture, while a low melting, non-shrinking Cerro Alloy is poured into space between bushing and hole.

Perhaps this method, used successfully during World War II for mass production of shell lathes, can help you save valuable production time. Write now for further information.

CERRO DE PASCO CORPORATION

C DE P ®

DEPT. 7 40 WALL STREET NEW YORK 5, N.Y.

New type grinders

Shown are seven new type Besly-Bowen radial head face grinders being readied for shipment from the Beloit, Wis., plant of the Besly-Welles Corp. These grinders feature two rotary work stations and an automatically controlled grinding cycle.

In operation, the grinders are started into automatic cycle over one rotary table, leaving the operator free to unload, clean and reload the alternate table.

Bores, profiles engine parts

A new machine for the boring and internal profiling of engine parts, the Alfing model HF 1/1000, has been introduced to the American market by Morey Machinery Co., Inc., Dept. BB, 410 Broome St., New York 13, N.Y.

Shafts which must be profile bored are first rough drilled and rough turned. A sizing bar is then placed in the shaft concentric with the O.D. and the space between is filled with a special matrix material which hardens in 5 to 10 seconds. A special machine is used for

LAST WORD
WHEEL DRESSERS
Simplify the Job!

PRECISION
ANGLE TANGENT TO RADIUS
WHEEL DRESSING

- Dresses grinding wheel at point of contact.
- Shortens dressing time.
- Simplicity of setting.
- Rugged for long life.

Above: These and countless other forms may be dressed simply with the Last Word Wheel Dresser. Write for Catalog

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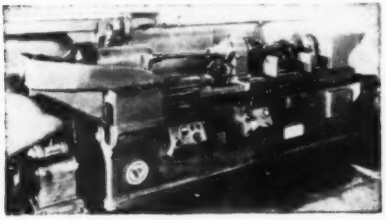
this operation which can serve a number of internal profiling machines.

Then the shaft is placed in the machine and the boring bar replaces the sizing bar in the matrix. This matrix serves as a continuous bearing for the boring bar until it is cut away, with



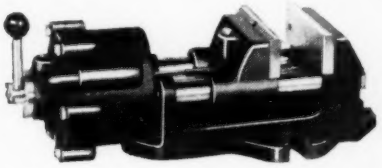
the chips, as the hole is profiled. The tool is hydraulically controlled to follow the profile of a templet mounted on the machine.

Chips and matrix are forced out of the hole by coolant under pressure and separated so that the matrix can be re-used. The shaft must be refilled with the matrix around a sizing bar between successive roughing and finishing cuts.

This method permits the design of jet engine snafts and rocket tubes of any desired length and interior profile, to provide rigid support for carbide tools, and, because of the method of chip removal, to allow a fine finish.

Air vise has controlled power

Boyd Machine, manufacturers of the Smith quick acting vises, announces the



addition of a new model designed to increase production through the use of controlled air power. The new air vise

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TO INCREASE PRODUCTION
TO IMPROVE EFFICIENCY

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BUTTERFLY FILING AND DIE MAKING MACHINE

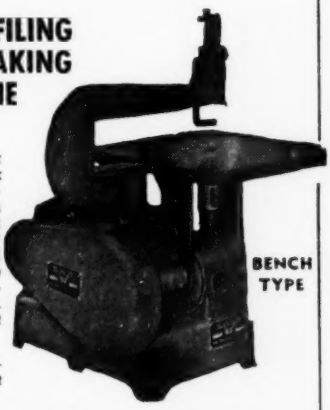
MOUNTED ON PEDESTAL

This is a powerful machine for heavy or small precision work in use all over the world: Airplane Factories, Ammunition Plants, Toolrooms where fast production is desired. 4 Models No. 16, No. 14, "EL" and Model "D". The larger the model, the larger the stroke and therefore more filing is performed. Furnished with or without pedestals.

Constructed as per Specification of U. S. Naval Aircraft Factories.

Our machine carries the Butterfly trade mark.

Registered U.S. Patent Office



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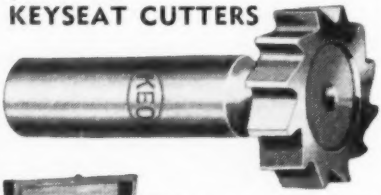
KEO

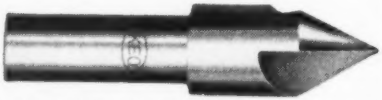
CENTER DRILLS

Made of finest high speed steel. Available in all standard sizes. Always in stock for *immediate delivery*. Specials made to your specifications.

KEYSEAT CUTTERS



High speed. Right hand ⅛" shank. Diameter from ¼" to 1½". Standard sizes in stock for immediate delivery. Complete set —41 sizes— available in sturdy, hardwood box. Saves time and money, because you always have the size you need.



CENTER REAMERS

High speed steel. Reamers from ¼" to 1" regularly furnished with 60°, 82°, 90° included angle. Specials made for your specifications.

LATHE MANDRELS

Precision made of tool steel, hardened and accurately ground. Tapered .0005" to the inch. Mandrels from 8/16" to 1" are .0005" undersize at small end, from 1⅛" to 3", 001" undersize. Immediate delivery.

Write for Literature

Illustrated literature and prices on all KEO Products mailed on request.

KEO CUTTERS

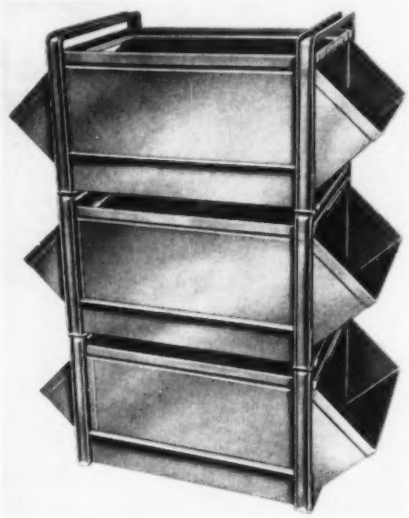
19326 Woodward - Detroit 3 Mich.

features a 5" jaw and a maximum opening of 7½". A sliding jaw is mounted on two large size hardened and ground bars. Cylinder pressure is transferred through the bars to the stationary jaw. This feature is said to eliminate strain in the base casting and to assure perfect alignment of the cylinder with the sliding jaw. Sandersen Sales Service, Dept. BB, Hamden 18, N.J., is distributor for this vise.

With a pressure ratio of 20 to 1, this air vise develops up to 3000 pounds holding pressure on a 150 pound air line. A hand operating valve is built directly into the cylinder. Speed controls are incorporated in the cylinder so that the work motion of the sliding jaw can be slow or fast to suit the job. Valve control lever can be attached to drill press spindle or milling machine travel to allow automatic opening and closing of the vise with the return motion of the machine.

Stackbins in Stackracks

For continuous assembly operations double-ended Stackbins in Stackracks serve operators on two assembly lines set up face-to-face. Materials or components are available and accessible from both positions. Reloading can be

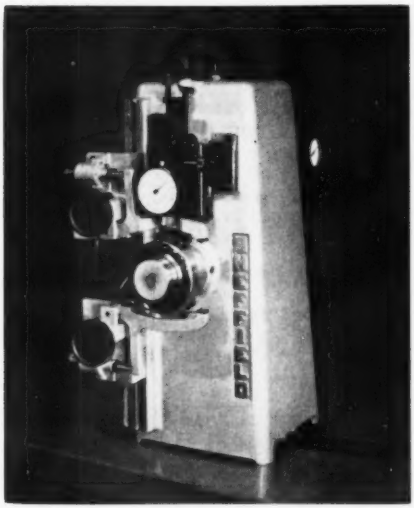


done from either end or by replacing with a full double ended Stackbin. They are made by Stackbin Corp., 1085 Main St., Pawtucket, R. I.

Stackbins and Stackracks are constructed of heavy gage steel with built-in stacking, index-card holders on both ends, and are finished in baked-on green enamel.

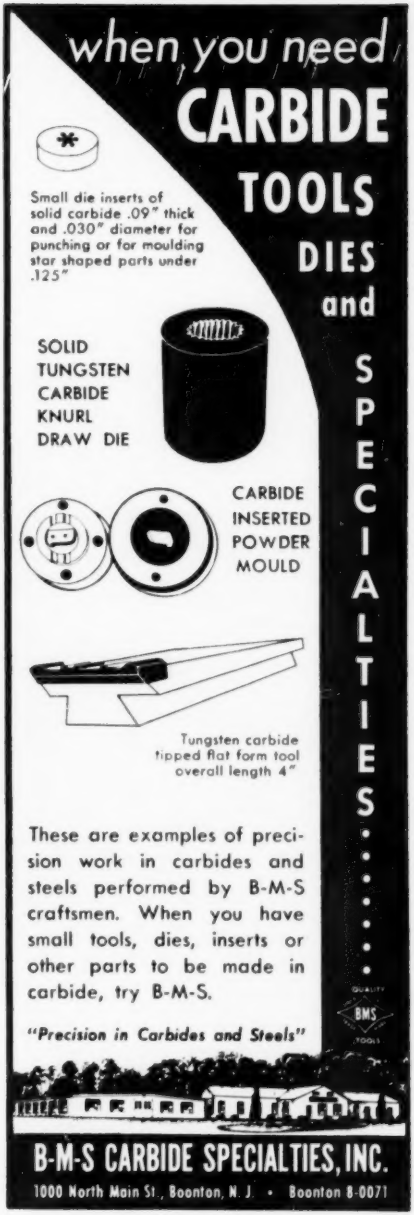
Radial play measuring instrument

A new pivotal arm type radial internal clearance measuring instrument is announced by The Sheffield Corp., Dept. BB, Dayton 1, Ohio. It is said to make possible easier, faster, and more accurate measuring of radial play in ball bearings. The instrument may be used to accurately measure radial play on a production basis as well as inspect



incoming shipments or set up control over radial play before bearings are assembled with their components. It is easy to use and an inexperienced worker can learn the simple 4-step operation in a short time.

One standard model is used for bearings with an outer diameter of 18 m/m to and including 90 m/m and another will accommodate an outer diameter from 90 m/m to and including 180 m/m. The measuring loads on both models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Small die inserts of solid carbide .09" thick and .030" diameter for punching or for moulding star shaped parts under .125"
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These are examples of precision work in carbides and steels performed by B-M-S craftsmen. When you have small tools, dies, inserts or other parts to be made in carbide, try B-M-S.
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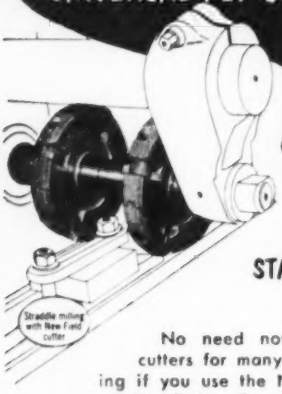
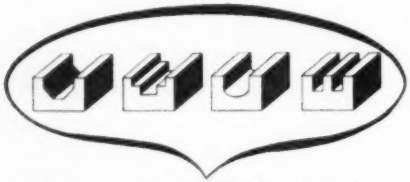
New-Field
UNIVERSAL FLY CUTTER



MAKES 4-6 CUTS IN ONE OPERATION!

USES STANDARD BITS!

No need now for special cutters for many types of milling if you use the New-Field Universal Fly Cutter. One New-Field cutter using any type of high speed steel or carbide bits makes multiple cuts in one operation. Standard bits are easily reground or replaced when needed for other work. Down time is cut to minimum.



These are only a few of the many different types of cuts possible with a New-Field Universal Fly Cutter.

New-Field Cutters fit all standard arbors on horizontal or vertical mills or drill presses, turn to any required speed, have adjustable bits to permit slots of any shape from 3/16" to 2" for fly cutting, slotting, surface and straddle milling, gear cutting, disc and gasket cutting. Available in 4", 6", 8" and 10" sizes, also 6" and 8" heavy duty size designed especially for Shell End Mill Arbors. Write today for details on this versatile, money-saving tool!

NEW-FIELD MACHINED PARTS CO.

210 W. 7th St., Los Angeles 14, Calif.
Export office: States Trading Co., 401 Broadway, N. Y. 15
Cable: STRADESO, New York

are adjustable to the standards of the Anti-Friction Bearing Manufacturers Association, Inc., Revision No. 1, April 1952.

The instrument features two easily adjustable, air-operated pivotal load bearing arms that alternately exert upward and downward pressure on the bearing. At the same time it measures the successive movements of the outer ring to determine the amount of radial play of the bearing in that position.

Other features include: an automatic shakedown of the balls into the bottom of the groove; direct readings without use of costly masters; a single three-station foot pedal control of load bearing arms; easily changed arbors that correspond to the internal diameter of a bearing's inner ring; and Sheffield's Guidegage feature to facilitate slipping the bearing on and off the arbor.

Tramrail cantilever carrier provides handling around pillars

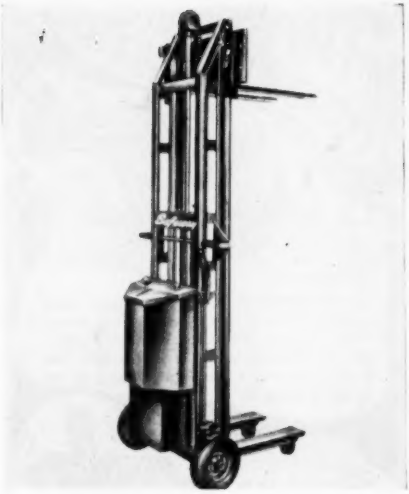
A new type overhead carrier with a cantilever arrangement that permits the unit to handle loads beyond the end of the crane on which the carrier operates has been developed by the Cleveland Tramrail Division of The Cleveland Crane & Eng. Co., Dept. BB, Wickliffe, Ohio.

The carrier was designed especially

to take care of situations requiring the handling of materials in areas between roof-supporting pillars that cannot normally be covered by cranes, and, also, for reaching through doorways.

The extension feature of the carrier, illustrated, permits the hoist to reach out as much as 2'-1½" beyond the end of the crane. When it is necessary to travel the crane for some distance on its runways, the carrier is moved from the crane end to permit safe clearance of the columns.

This unit has a capacity of 1500 lbs. Other cantilever carriers of different load capacities and reach can be made to suit conditions involved.



Lift truck for heavier loads, greater heights

Safeway Industrial Equipment Corp., Dept. BB, 184 North Franklin Street, Chicago 6, Ill., announces a powerful new portable lift-truck, designed for maximum safety with one man operation, it is claimed.

This new unit is made in three sizes with lifting heights of 68", 80", and 100", and has a lifting rating of 1250 lbs. The hydraulic system used is powered by an automotive type battery and is equipped with a built-in charger

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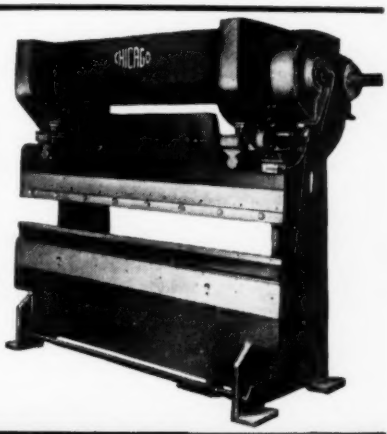
STEEL

PRESS BRAKES

43 Standard Sizes

Readily adapted for a wide variety of bending, forming, drawing, notching, blanking, punching, embossing, etc.

DIES Complete Line of Induction Hardened Dies for All Makes and Sizes of PRESS BRAKES.



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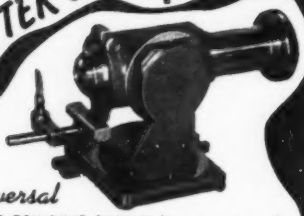
CHICAGO STEEL BENDING BRAKES BOX and PAN BRAKES PRESS BRAKES

NOW! A LOW-COST CUTTER GRINDING FIXTURE



The *Universal*
CUTTER GRINDING FIXTURE fits any universal tool or surface grinder. The basic unit, shown here (standard accessories not shown), with its four attachments, below, provide a quick and accurate answer to nearly all cutter and tool grinding demands.

Precision BALL END MILL grinding is done with this compact, easily-operated fixture. An exceptionally flexible instrument, it grinds up to 2¼" dia., sets at any angles or radius with any cutting clearance on square, conical or ball nose shaped end mills.

◀ The MULTI-SWIVEL VISE attachment employs three swivels for quick set-up of any compound angle.

◀ This versatile INDEXING LOCK BRACKET may be set up in any position at either end of spindle housing on basic unit.

◀ For precision GRINDING WHEEL DRESSING this attachment will handle any two angles as well as set radius.

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with automatic cut-off and trickle charge.

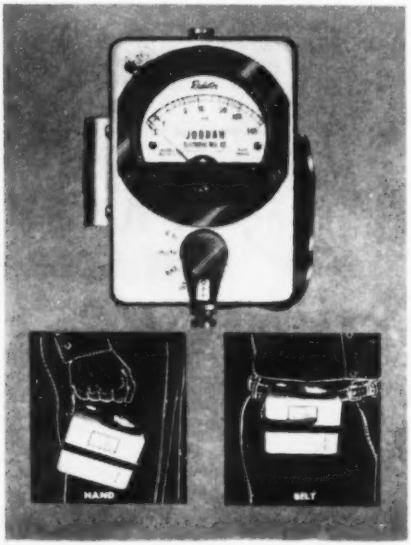
The Safeway lift truck is equipped with an electronic switch to cut off power at maximum height and prevent jarring load and damage to hydraulic system; also hand operated brake which will not only prevent movement of truck when loading and unloading but will brake the truck when travelling up and down inclines.

While of the fork lift type, it can be equipped with a "snap-on" platform to make it an all around combination lift truck.

Gamma radiation detector

A new portable radiation detector, known as the Radector, is now being manufactured by the Jordan Electronic Mfg. Co., Inc., Dept. BB, 119 East Union St., Pasadena, Calif.

The Radector utilizes the Neher-White ionization chamber, an invention



of R. E. White, and developed in collaboration with Dr. H. V. Neher of Pasadena. This ionization chamber is claimed to have made possible measurement of background radiation to over 1500 R/hr., i.e., from the radiation of common soils to rays over 15,000,000 times as strong.

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For precision fitting, checking clearances, inspection and production work. Available in 12" strips, ½" wide, in cellophane, packed 12 pieces of one thickness to a box, also in 25-foot coils. 14 standard thicknesses from .0015" to .015".

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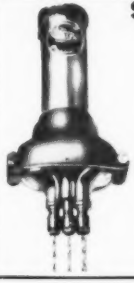

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In stock for immediate delivery.

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No. 1D min. 1.16" max. 6.33"—No. 1 M.T.
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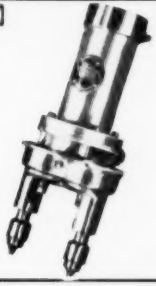

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FINGER STOPS
IN 3 SIZES

STOP-PINS are complete self contained units that hold securely in stripper plate. All sizes have 1/32" wall permitting insertion close to die or punch. No threads inside STOPS for springs to catch on. Write for literature and prices. GARBERDING FINGER STOPS made in uniform width to fit any standard width slots. Just grind ends to fit.

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BLACK GRANITE SURFACE PLATES

Present an absolute continuous bearing surface, finished up to 50 millionths inch. Incredibly smooth. Falling objects do not cause humps. Being harder than hardened steel, can take greatest mistreatment without causing inaccuracy of surface. No oiling. Will not rust or warp. No re-scraping. Most durable.

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Avoid substitutes
Immediate delivery in most sizes from 9x12 to 48x144.
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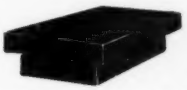

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These fast, sturdy, easily operated machines put your riveting on a production basis in terms of speed and low cost. We'll gladly demonstrate what they can do and the high quality of work they turn out. Send samples of your parts to be riveted and we'll give you time and cost estimates on handling your rivet spinning on a LINLEY.

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- Simple Operation
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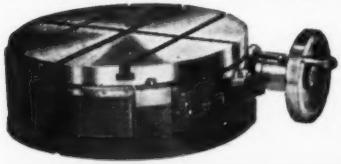
Troyke Worm Wheel Operated Tables



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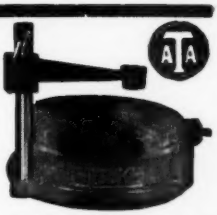
Fully illustrated showing all models and applications to various work.



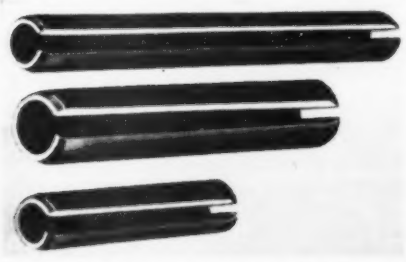
Drilling attachments can now be furnished for Worm Wheel Operated Tables.

TROYKE MFG. CO., Cincinnati 9, Ohio, U.S.A.

Spring pin

A new division has been set up by Standard Pressed Steel Co., Dept. BB, Jenkintown, Pa., to manufacture and sell a new SPS product—a self-locking, spring-pin fastener.

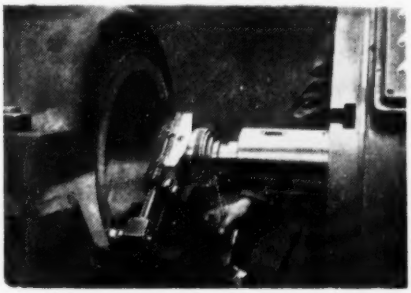
The fastener, called the Sel-Lok spring pin, is said to replace tapered, grooved and dowel pins in all kinds of assemblies. It is vibration proof, absorbs shock, is easy to insert and remove and eliminates reaming operations.

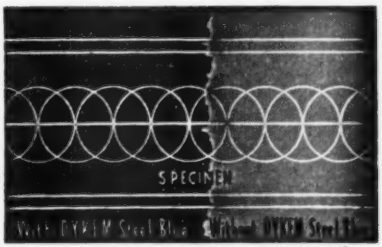


SPS set up the new division after buying the production machinery, inventory, patents pending and other assets of the Self Lock Fastener Corp. from the Rafter Machine Co., Belleville, N.J., early this year.

German-made facing, boring heads

Karl A. Neise, Dept. BB, 381 Fourth Avenue, New York 16, N.Y., exclusive distributors in the U.S. and Canada, announce the addition of two new models by Wohlhaupter & Co. to their line of universal facing and boring heads. Made in Germany, the new





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Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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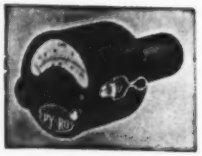
THE DYKEM COMPANY

2301G North 11th St. St. Louis 6, Mo.

"Masterheads" are models UPA 6 and UPA 6-S7, making a total of nine sizes now available.

The Masterhead is applicable to boring mills, jig borers, radial drilling machines, lathes, millers and other machine tools as well as to production units. It can be used for boring, facing, recessing, undercutting, taper and form turning and also for threading stationary work without reclamping.

PYRO Radiation Pyrometer



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BLOOMFIELD TOOL CORP.
36 FARRAND ST. BLOOMFIELD, N.J.

Plastic coating process developed

Through a new process, Pyramid Plastics, Inc., Dept. BB, 554 W. Polk, Chicago 7, Ill., can apply a plastic coating on such items as flexible steel tubing, metal and paper jacketed tubing and other hard-to-coat materials. The

process is applied according to customer requirements with various types of thermoplastic materials.

The method is said to produce a continuous coating that leaves a smooth outer covering which will not reduce the flexibility of the product itself or allow the coating to penetrate small openings in the item to be covered.

Medium duty coolant pump announced

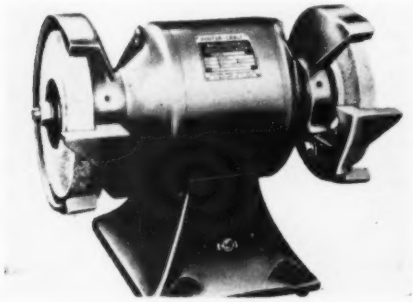
A new medium-duty portable coolant pump, Model 8-5, designed for machines without built-in coolant pumps and not requiring the extreme capacity of the heavy-duty Model 10-10, is made by Shellback Mfg. Co., Dept. BB, 11831 Hamilton, Detroit 3, Mich. It pumps 12 gallons per minute against 4' head and 5 g.p.m. against 8' head.

The self-contained model has a 1/15 h.p. motor; single bearing open type with splash shield.

Radio broadcasting stations offer a special problem to civil defense officials in case of attack. Radio offers one of the best mediums of communication in an emergency, but also can serve as directional beams for enemy aircraft and guided missiles. For this reason some stations will be ordered off the air when an alert sounds. Others will continue to broadcast official civil defense instructions.

Porter-Cable announces bench grinders

A one-quarter h.p. double arbor 6" lathe-type bench grinder is the first in a series of four models which have been introduced by the Porter-Cable Machine Co., Dept. BB, Syracuse, N. Y. This unit is designed for use in small shops, garages, home workshops, farms, service stations, and for intermittent duty in factories. Model 116 takes 6" by 5/8" grinding wheels with 1/2" bore.



The model 517 is a 1/3 h.p. grinder taking 7" x 3/4" grinding wheels with 1/2" bore. This machine is suitable for large automotive shops, toolrooms, industrial woodworking and school shops.

Model 518 is a 1/2 h.p. machine taking 8" by 1" wheels with 5/8" bore. It is a heavier duty version of the 517.

Model 519, largest grinder in the line, is built for continuous duty in factories, foundries, machine and welding shops, and whenever a powerful grinder is necessary for rugged work. It has a 1 h.p. motor, and takes 10" by 1" wheels with 3/4" bore.

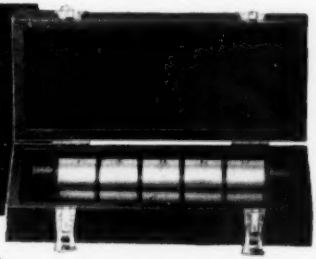
All grinders run at 3,450 r.p.m., except the largest model which turns at 1750 r.p.m.

Small rolling mills

A new line of three and four inch rolling mills developed by the Stanat Mfg. Co., Dept. BB, Long Island City, New York, through the use of standard, interchangeable parts, can be "tailored" to meet individual requirements, without resorting to complete redesign. Rolls are furnished either flat or grooved to

Check Surface Roughness Waviness and Lay INSTANTLY

. . . Right At The Machine



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Available in groups of 3, 5 and 8 specimens. Low cost.

Consists of various surface specimens, *individually finished* to definite micro-inch readings, grouped together in one handy comparison bar. Merely hold bar opposite work for fast, visual comparison check of surface roughness, waviness and lay.

ACME INDUSTRIAL COMPANY

Mfr's. of Drill Jig & Fixture Bushings

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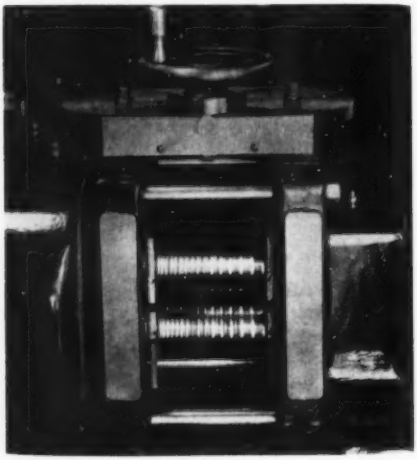
produce a great variety of shapes such as round, square, half-round, diamond, or special shapes for individual requirements. Rolls are also supplied for such purposes as reducing or compacting small tubing sizes. A typical grooved roll in the three inch diameter machine might produce square wire in sizes from 0.250 in. down to 0.040 in. In the 4 in. diameter machine, this range of sizes can be materially increased. By mounting two 4 in. machines side by side on a single base, wire can be rolled from 0.750 in. down to 0.040 in., but reduction ranges can be varied to suit individual needs.



Aluminum gas meter

A new aluminum version of its standard No. 1 gas meter has been introduced by Rockwell Mfg. Co., Dept. BB, 400 N. Lexington Ave., Pittsburgh 8, Pa. Weighing only 22 pounds, the new meter has been designed to offer increased ease in handling and setting, reduction in shipping costs and greater resistance to weather and shock.

The meter has a maximum capacity of 275 cubic feet per hour (at ½-in. pressure drop with 0.60 specific gravity gas).

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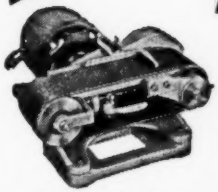

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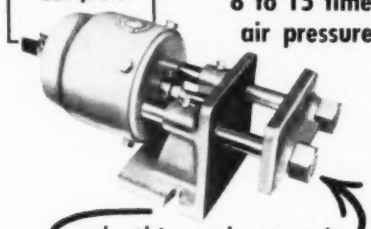

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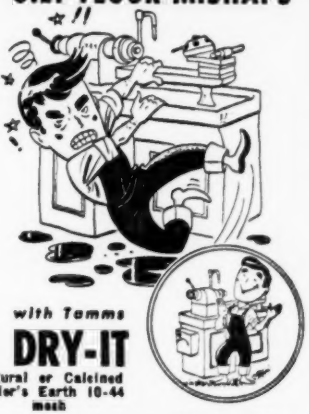

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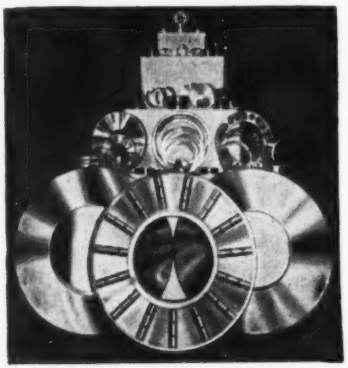

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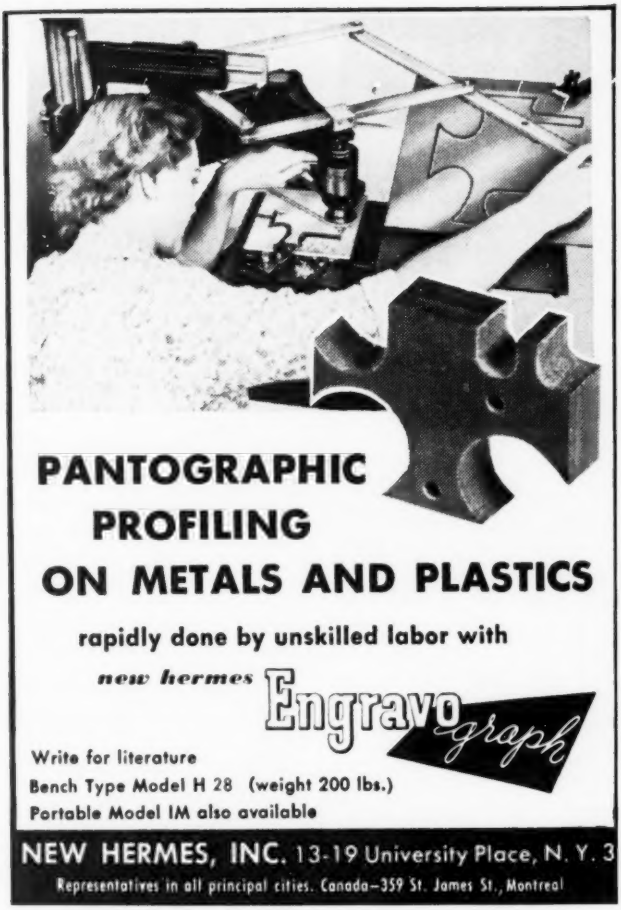
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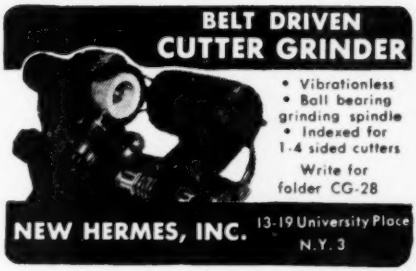
Rack for bar stock ends hauling

The bar stock rack manufactured by the Yohe Supply Co., Dept. BB, Canton 4, Ohio, is said to save space and time, and to keep stock in full vision. Its several arms give immediate access to desired size of stock. Arm capacity is about 10" dia. opening over hooks about 4¼". Weight capacity is 10,000 lbs. for three stand set. Three stands are required for 20 ft. lengths. Double racks, accessible from both sides, can be made by placing two stands back to back.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CUTTER GRINDER
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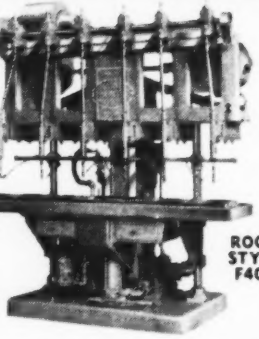

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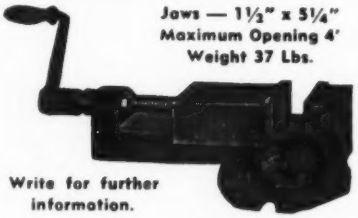

Jaws — 1½" x 5¼"
Maximum Opening 4'
Weight 37 Lbs.

Write for further information.

The body is made of semi-steel; the jaws of tool steel hardened and ground. All working surfaces are ground. The vise is as accurate as is possible and the degrees are cut to very close limits.

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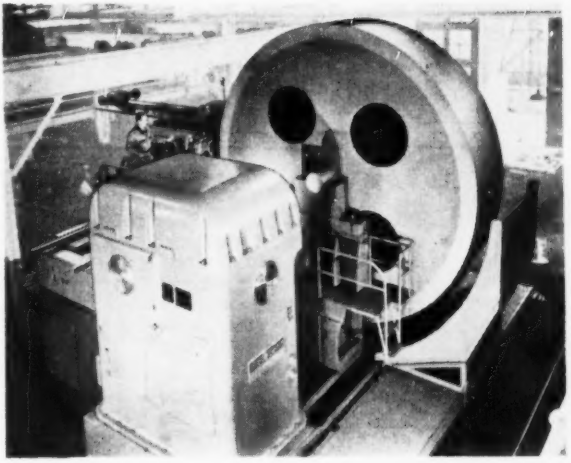
World's largest gear shaving machine

The world's largest shaving machine just now completed by National Broach & Machine Co., Dept. BB, 5600 St. Jean, Detroit 13, Mich., will handle gears up to 180" P.D. and, with certain modifications, work gear diameters could be increased to 200".

A gear 180" in diameter will weigh approximately 30 tons and will have from 900 to 1800 teeth depending on its diametral pitch. In a properly hobbed gear, the shaving process reduces errors in tooth profile to a tolerance of .0002" and index or pitch errors to .0003". Perfect tooth surface smoothness is also attained, but without any danger of surface burns.



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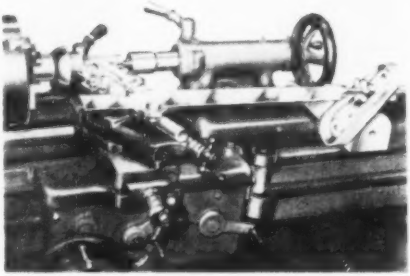
Duplicating attachment for engine lathes

Model EL-1100 Pro-Tracer, manufactured by Lehigh Foundries, Dept. BB, 1500 Lehigh Drive, Easton, Pa., is designed for lathes handling up to 13" work. All models are precision-built and constructed with ample strength margins to permit use on three-shift production runs when this is desirable, it is claimed.

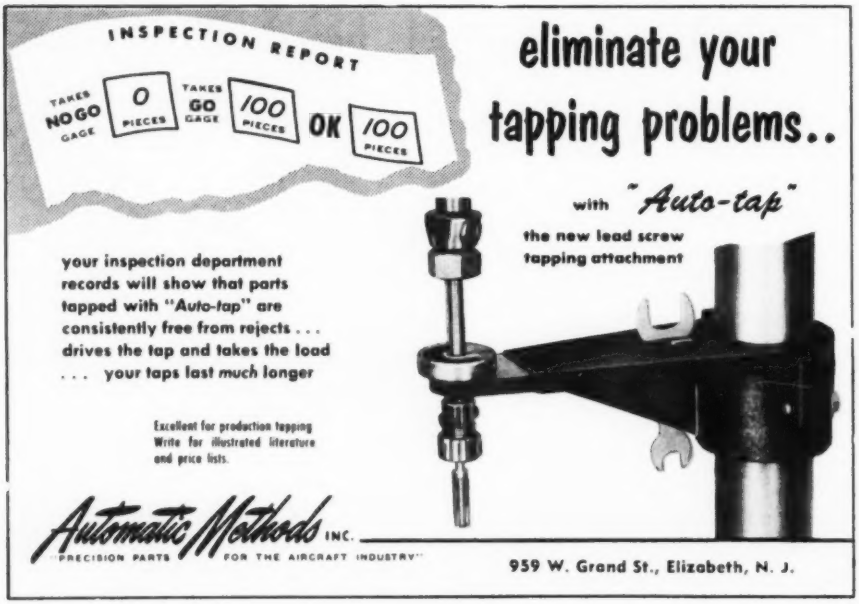
Installation is simple. The tool post is removed and a single bolt securely fastens Pro-Tracer to the compound in such a fashion that it can be adjusted to any cutting angle. A second bolt secures the fully-adjustable template-holding bracket to the lathe bed. Full use of both cross feed and compound is permitted at all times.

Accurately-ground ⅛"x2" wide gage stock templates are recommended to guide the movement of the Pro-Tracer slide. Template length is limited only by the length of the lathe. Pre-loaded ball bearings in the slide assembly prevent play, back lash and tool lag.

Boring and I.D. contours can be turned by the same method as conventional O.D. turning and a 90° step can be cut in the direction of the feed. Pro-Tracer



can be used effectively for all types of O.D. turning, including tapers, and it will make an .031 minimum radius and will turn an unlimited maximum radius.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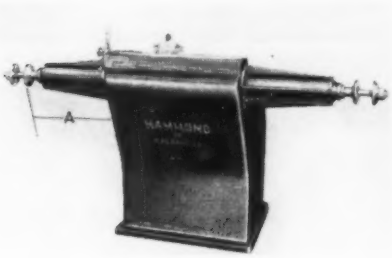
Variable speed buffing lathe

Hammond Machinery Builders, Inc., Dept. BB, 1600 Douglas Ave., Kalamazoo, Mich., announces a new 10 h.p. Model 10 VROW wide-swing variable speed polishing and buffing lathe.

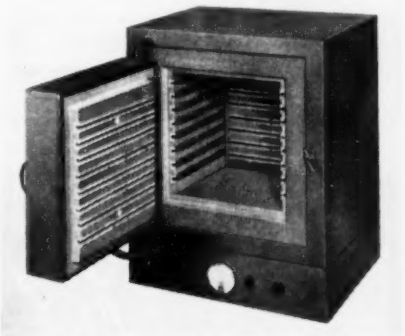
This lathe has extended spindle affording maximum working area around



the wheels and has a variable spindle speed range of 1500 to 3000 r.p.m. The speed is instantly changed by dial control while machine is running.

New line of electric furnaces

The L & L Mfg. Co., Chester 62, Pa., announces a new line of 37 electric furnaces. Known as Dyna-Kiln electric



furnaces, each model is heated by new Dyna-Glow elements resting in Dyna-Glow element holders.

The furnaces are available in 2050° F and 2300° F heat ranges, in front loading and top loading models.

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to J. I. C.
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BOLSTER BOLTS — dia. to 1½" Heads sq. to 3" hex. to 2⅜" T-Slot bolts, ½", ⅝", ¾" dia. lengths to 12". 1" dia. 4" to 22" long.

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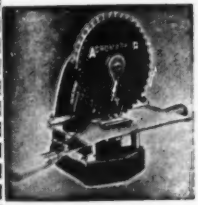

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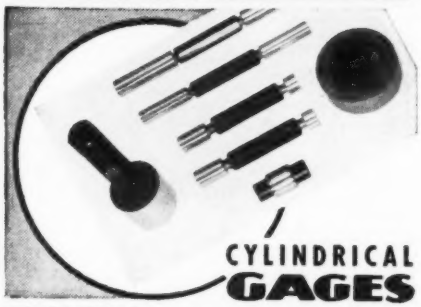

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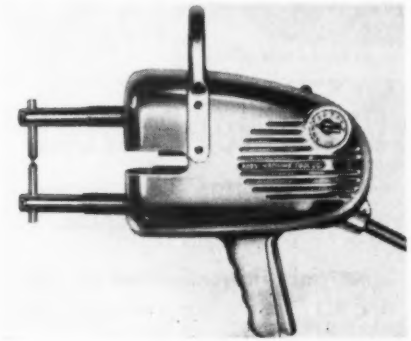
Several Attractive Territories Open for Manufacturers' Representatives

Electronic portable spot welder

A portable spot welder with built in thyrotron controlled timer switch is now being marketed. Any timing cycle from 1/60th second to a full second may be established by switch setting. All electronic controls and a transformer, suspended for quick heat dissipation, are contained in the polished aluminum housing. The weight is 26



lbs. It is made by Ross Machine Tool Co., Dept. BB, 7631 S. Ashland Ave., Chicago 20, Ill.

It will weld most alloys of aluminum sheets, as well as mild, stainless, galvanized and cadmium plated steel and other metals, to a 3/16" combined thickness. The welder operates from 220-240 volt 60-cycle a.c. and develops electrode pressure to 1000 lbs. and amperage over 12000 at point of weld. Standard model has 7" throat depth and 3" opening. Additional throat depths up to 18" and special shaped arms and tips are available.

New type lubrication

Molub-Alloy is said to be a new concept in lubrication which employs petroleum as a vehicle instead of as the primary lubricating agent. It is manufactured by Imperial Oil & Grease Co., Inc., Dept. BB, 6399 Wilshire Blvd., Los Angeles 48, Calif., in a wide range of types and weights from high quality hydrocarbon base stock or synthetic or volatile base materials to which has been added scientifically homogenized micron-sized particles of self lubricating metallic solids. These act as millions of micron sized ball bearings. One of the metallic solids used is molybdenum disulphide (MoS_2).

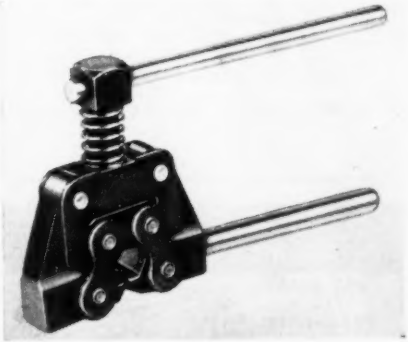
Each molecule consists of a layer of metallic alloy atoms combined with a layer of sulphur atoms. The sulphur atoms, having a strong affinity for metal, adhere to the surface and support the metallic atoms, to form a metallic lubricant which is resistant to water, high heat and high pressures and temperatures, and which has unusual tenacity or adhesiveness to metal surfaces.

Chain breaking tool

The Boston Gear Works, Dept. BB, 14 Hayward St., Quincy, Mass., announces a new chain breaking tool, CBT60.

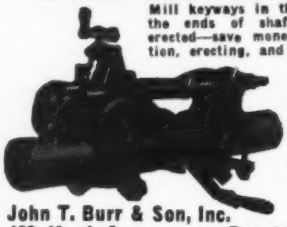
This tool is said to disconnect any pitch roller chain manufactured according to the specifications of the American Chain Mfrs.' Ass'n., from ¼" pitch up to and including ¾" pitch. The jaws are of pearlitic malleable iron, heat treated. The pressing tip is of case hardened tool steel and all other vital parts are heat treated. The Boston gear chain breaking tool is 5½" in length.

The roller link of the chain to be disconnected is inserted between the jaws



of the tool. The adjustable lever is turned, forcing the pressing tip to push the pin through the pin link plate. The process is repeated on the pin at the other end of the same pin link plate, and the chain is then disconnected.

BURR KEYSEATERS



Mill keyways in the run or on the ends of shafting already erected—save money on alteration, erecting, and repair work.

Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

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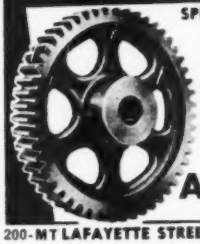

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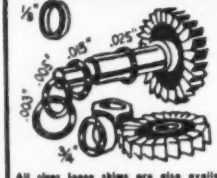

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Each set contains 19 pcs. from .001" to 125".

Diameter of Hole	Outside Diameter	Price per Set
½"	1⅛"	$1.50
1 "	1½"	1.50
1¼"	1¾"	1.70
1½"	2⅛"	2.20

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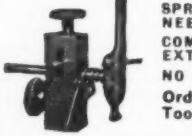

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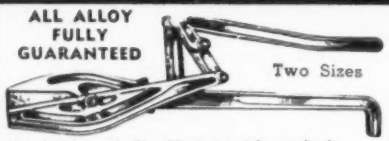

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No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to ¼" steel plate.

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KING PORTABLE BRINELL

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Puts actual load of 3000 KG on 10 mm. ball.

Test head removable for testing very large parts.

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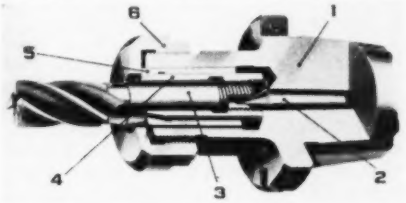
Shakeproof "breather" plug

A new spring stamping designed to cover access holes for adjustment screws or to provide for internal ventilation in the doors of refrigerators and the lids of freezers has been developed by Shakeproof, a division of Illinois Tool Works, Dept. BB, St. Charles Rd., Elgin, Ill. Although specifically designed for use in refrigerator and freezer units, a plug of this type may be used wherever there is a need to cover a hole in sheet metal or plastic units and yet provide for air passage or easy access. Sizes to fit $\frac{7}{8}$" and 1" holes are available.

Self-locking chucks

The Autolock chuck, which eliminates the use of adaptors throughout the range of its two capacities (1/16" to $\frac{3}{4}$" and $\frac{7}{8}$" to $1\frac{3}{4}$"), and its big brother the Dedlock chuck which handles cutters from 2" to 6", are distributed by Clarkson Inc., Dept. BB, 320 Ontario St., Toledo, Ohio. Both types of chucks are accompanied by a wide range of clarkson cutters, all made in England. The Autolock chuck consists of the follow-



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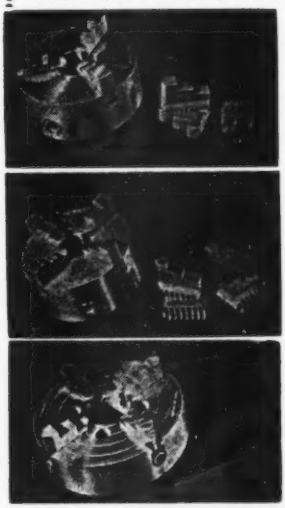


BURNERD CHUCKS *with UNBREAKABLE MECHANITE BODY*

NOW AVAILABLE FITTED WITH THREADED BACK-PLATE TO FIT STANDARD AMERICAN LATHES

SELF CENTERING GEARED SCROLL

Nickel Chrome Steel Pinions & Scroll, Semi-Steel Body, Universal Three Jaw, Two Sets of Jaws, Three Pinion.

Model	Size	Weight (lbs.)	Bore (Chuck)	Thread (Backplate)	Price
30BP	4"	$8\frac{1}{4}$	1	$1\frac{1}{2}$-8	$33.50
30ABP	5"	15	$1\frac{1}{2}$	$1\frac{1}{2}$-8	42.50
30ABP-2	5"	15	$1\frac{1}{2}$	$2\frac{1}{4}$-8	45.00
31BP	6"	21	$1\frac{7}{8}$	$1\frac{1}{2}$-8	50.00
31BP-2	6"	21	$1\frac{7}{8}$	$2\frac{1}{4}$-8	52.50
52BP-2	$7\frac{1}{2}$"	$33\frac{1}{2}$	2	$2\frac{1}{4}$-8	65.00

Universal Four Jaw, Two Sets of Jaws, Two Pinions

Model	Size	Weight (lbs.)	Bore (Chuck)	Thread (Backplate)	Price
30AYBP	5"	$15\frac{3}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$-8	$48.50
31YBP	6"	22	$1\frac{7}{8}$	$1\frac{1}{2}$-8	57.50
31YBP-2	6"	22	$1\frac{7}{8}$	$2\frac{1}{4}$-8	60.00
52YBP-2	$7\frac{1}{2}$"	$33\frac{1}{2}$	2	$2\frac{1}{4}$-8	92.50

LIGHT INDEPENDENT CHUCKS

Nickel Steel Operating Screws, Semi-Steel Body, Four Jaw Reversible, Hard Steel Jaws

Model	Size	Weight (lbs.)	Bore (Chuck)	Thread (Backplate)	Price
35BP	4"	$6\frac{1}{2}$	1	$1\frac{1}{2}$-8	$18.00
35CBP	$4\frac{1}{2}$"	7	1	$1\frac{1}{2}$-8	22.50
34BP	6"	14	$1\frac{5}{8}$	$1\frac{1}{2}$-8	26.50
34BP-2	6"	14	$1\frac{5}{8}$	$2\frac{1}{4}$-8	28.50
37BP-2	8"	22	$1\frac{5}{8}$	$2\frac{1}{4}$-8	38.50

When ordering please specify make of lathe to insure exact fit

DE WITT EQUIPMENT CO. 136 Lafayette St., New York 13, N.Y. Telephone: WA 5-4048

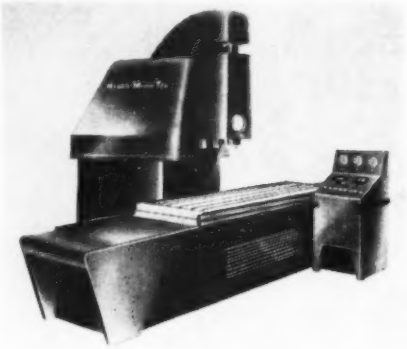
ing parts, as numbered in Figure 1:

1. The arbor or main body of the chuck which is made with a taper to fit any machine;
2. The male centre, which keeps the cutter centered and insures rigidity while cutter is operating;
3. Cutter;
4. The collet, which has two dogs that fit into the neck of the chuck body, to prevent the collet from turning;
5. The sleeve, which houses the collet and has a tapered portion which mates with that of the collet;
6. The retaining nut, which is tightened by light hand pressure onto the threaded neck, retaining sleeve in correct position.

In operation, any tendency of the cutter (3) to turn creates a drawing action on the cutter's threaded end which forces the collet (4) down the shank of the cutter. The tapered portion of the collet is thus pressed into the mating taper of the sleeve (5) which in turn causes the collet to grip the shank of the cutter even tighter.

Hydro Micro-Tel vertical tracing, profiling and milling machine

The availability of the Hydro Micro-Tel unit was announced recently by the De Witt Lewis Co., Dept. BB, 3629



Sophia St., Wayne, Mich., national marketers. This unit is described as a precision master vertical mill and

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The three photos at right illustrate the flexibility of 12-position indexing, whereby each tool may be used in three different working positions.
¾" square tool bit mounted in Model 4½-S turret used for facing cut.
✓Accurate within .0005.
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✓Mounts rigidly in compound T-slot.
The same tool used for broadface turning merely by indexing turret 1 position or 30°
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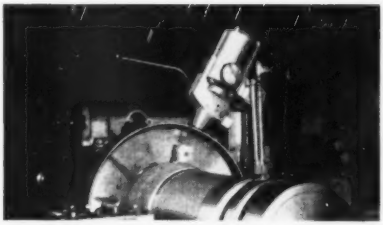

Above is shown a 6M Fen Automatic Wrench operating a 28" heavy duty chuck.

• • •

For detailed information regarding the application of the Fen Automatic Wrench to your machines, phone, wire or write.

ELIMINATE "WRENCH WRESTLING"

You can put the advantages of the Fen Automatic Wrenches to your work right in your own shop on machines already in operation, or specify them on your new standard or automatic machines.

THE FEN MACHINE COMPANY
28914 Lakeland Blvd.
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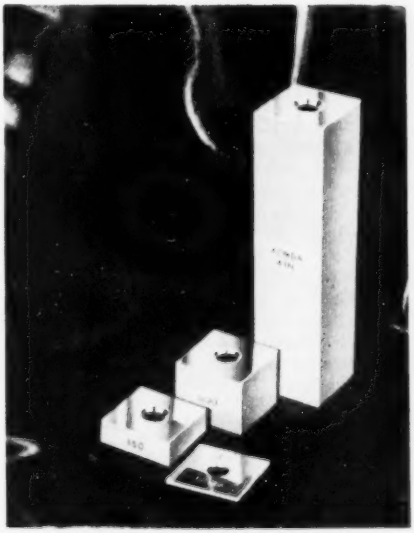
precision tracer-profiler.

The Hydro Micro-Tel has an automatic dynamic support leveling which levels the table and keeps it level automatically with the removal of metal. This is accomplished through air-hydradyne jacks and sensitized leveling support. According to reports, the Hydro Micro-Tel is equipped with automatic gib locking devices. The gibs automatically lock by the air hydradyne system and must be released by a dial before they can be moved. It is claimed that desired pressure can be exerted on the gibs, while in movement, to give the closest possible tolerances, accurate to .001"; electronic tracing or profiling accurate to .0002". This unit is also said to have spindle selective power feed and depth control to .0001".

New Fonda gage line

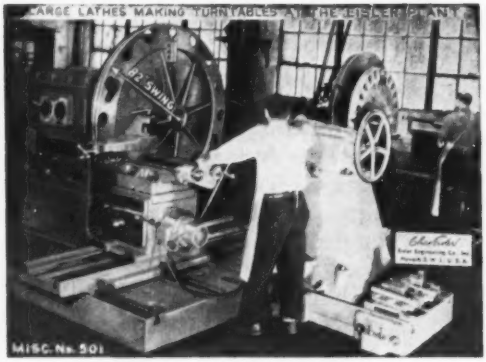
The Fonda Gage Sales Corp., Dept. BB, 38 Broad Street, Port Chester, N.Y., is now offering a complete line of square gage blocks (square and rectangular), in all three materials, i.e.,

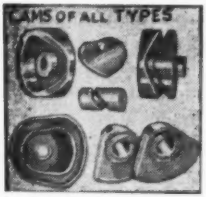


steel, carbide and chrome carbide.

Quick identification of this Fonda square block is accomplished by num-

LARGE LATHE Work To Your Order





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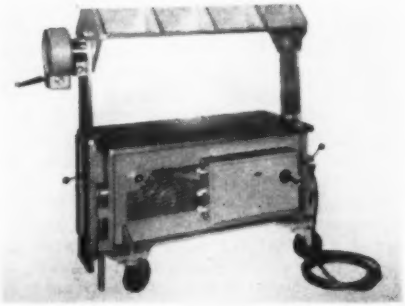
bering on a ground band located on the sides of the larger blocks and, on the smaller blocks, etching near the edges of the gaging surface (the center section being left clear for comparator use).

Motorized die handler

The Hansford die handler, which is a portable device for taking apart heavy dies, can now be equipped with a motorized lift attachment. This attachment can be installed at the factory or can be purchased at a later date and installed on the machine by the customer. Mounting holes are incorporated in all standard models of the die handler. It is made by Hansford Mfg. Co., Dept. BB, 1239 University Ave., Rochester 7, N.Y.

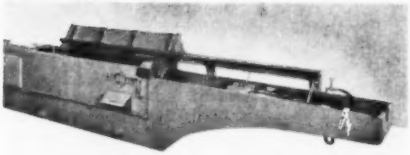
The motorized lift attachment drives the upper platen of the die handler at the rate of 16.3" per minute. It is used for rapid movement of the upper section. Fine adjustments are made by means of the hand crank. A safety precaution is incorporated which makes it necessary to disengage the hand crank



before connecting the motorized lift. By the same token the motorized lift must be de-energizing before reconnecting the hand crank.

Traveling broach carrier reduces multiple broach handling

Time and effort on operations requiring the use of multiple broaches in sequence are reduced by a handy broach carrier rack, which is attached to and travels with the ram of a hori-



zontal broaching machine. Available from Colonial Broach Co., Box 37, Dept. BB, Harper Station, Detroit 13, Mich., the rack can be designed to be adapted to any standard Colonial horizontal broaching machine where broaches are manually handled.

As the ram moves back and forth, the rack carrying the broaches moves with it. After each broaching pass, the broach is removed and placed in the rack. The ram is returned to a starting position, and the next broach is selected from the rack and inserted in the puller.

Cemented carbide inserts

An expanded line of solid cemented carbide inserts for mechanical tool holders is announced by Carboloy department of the General Electric Co., Dept. BB, Detroit 32, Mich. It includes four new blank sizes in two new shapes in both the present standard unground and ground lines.

New sizes and shapes added to the company's current line of unground insert blanks are: a $\frac{5}{8}$-inch diameter inscribed circle triangular insert, a 55 and 80-degree, diamond-shaped insert and a $\frac{3}{4}$-inch square insert. The first three are made with both standard radii and sharp corners (max. flat 0.010-inch). The $\frac{3}{4}$-inch square insert is manufactured with sharp corners and standard chamfers.

Inserts added to the stocked standard ground line are: a $\frac{5}{8}$-inch diameter, inscribed circle triangular insert, a 55 and 80-degree, diamond-shaped insert, and a $\frac{3}{4}$-inch square insert.

In addition, all triangular and diamond-shaped inserts are available with special corner radii.

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"IMPAX" HAMMERS with specially designed shot-loaded head, strike **controlled** "stay-put" blows . . their mighty impact cuts one blow out of three. Spark-proof surfaces eliminate fire and explosion hazards . . . non-chipping prevents worker injury from flying particles.

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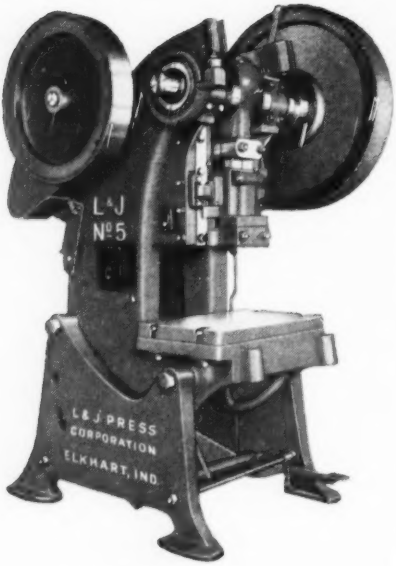

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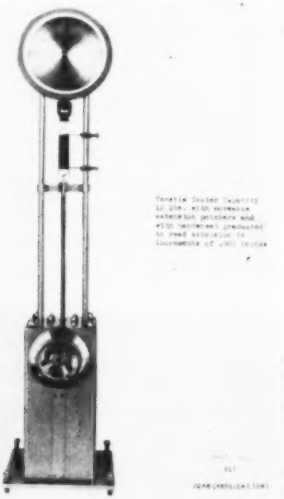
Small capacity tensile tester

The newly developed small capacity tensile tester, manufactured by John Chatillon & Sons., Dept. BB, 85 Cliff St., New York 38, N. Y., is designed to measure the tensile properties of fiber, cloth, cord, rubber, and many other similar materials.

It is operated by means of a handwheel which is graduated to read extension in increments of .001 inches. This handwheel drives a single thread worm gear which automatically holds the tension at any given point. Tension



load is read by a single pointer which will remain at the point of maximum load until it is manually reset to zero.

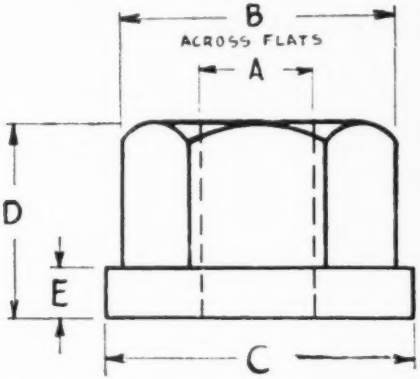
Standard capacities are available from 1 to 100 lbs. with the following graduations: 1 lb. x .01 lbs.; 5 lbs. x .02 lbs.; 10 lbs. x .05 lbs.; 25 lbs. x 1 lb.; 50 lbs. x .25 lbs.; and 100 lbs. x .25 lbs. The dials range in diameter from $7\frac{3}{4}$ inches for the smaller capacities to 10 inches for the larger. (Metric graduations are also available within the range of the tester.)

The tester is approximately 3 feet high and is normally supplied with quick action clamps capable of holding specimens up to 1 inch wide by $\frac{1}{8}$ inch

thick at a maximum extension distance of 15 inches. An additional feature is the easily adjusted tolerance pointers which are held to the dial arm by permanent magnets.

Collar or flange nuts

Collar or flange nuts are one of the new products in the line of tool components being made by Reid Tool Supply Co., Dept. BB, 709 Baker St., Mus-



kegon Heights, Mich. They are made of low carbon steel and case hardened; they are zinc plated for appearance and rust prevention. Nine sizes are available for use on bolts or studs ranging from ¼" to 1" in diameter.

Feed mounting adapter

A new adjustable feed mounting adapter is announced by the H. E. Dickerman Mfg. Co., Dept. BB, 321 Albany St., Springfield, Mass., designed for use with its several models of die feeds and the Rol-Di-Feed. This adjustable feed mounting adapter is said to permit quick and simple adjustment of the stock line of the feed with the stock line of the die and also alignment of the feed with the set edge of the die, thus eliminating the necessity for using shims, in addition to reducing setup time. The device consists of a mounting base and a feed mounting member which is already drilled and tapped to accommodate all sizes of feeds. Vertical adjustment is attained through use of

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". . . only with diamond 'bort' to sharpen carbide-tipped tools can volume and quality be maintained."

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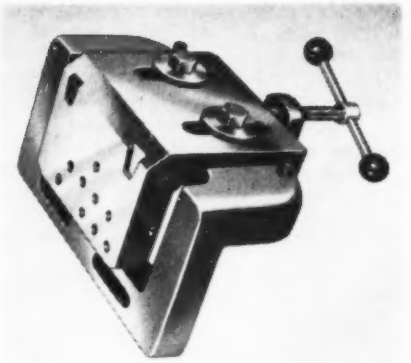
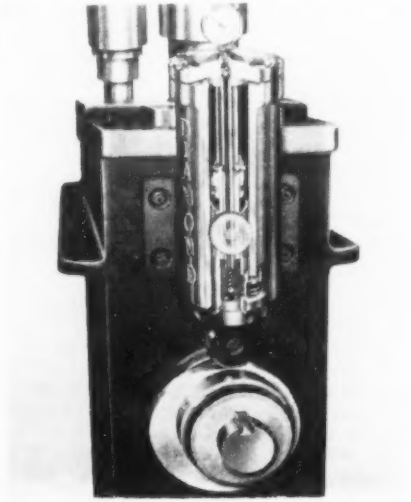


the built-in screw jack; and slotted screw holes in the mounting base, which is attached to the bolster plate of the press, permit horizontal adjustment.

Pneumatic clutch equilibrator

The Diamond Machine Tool Co., Dept. BB, Pico, Calif., announces a new clutch equilibrator that is now standard equipment on their line of Diamond Multi-



Max punch presses and shears.

The equilibrator is a two-part unit consisting of a heart shaped cam and an air chamber with an automatic pumping and regulating mechanism. This devel-

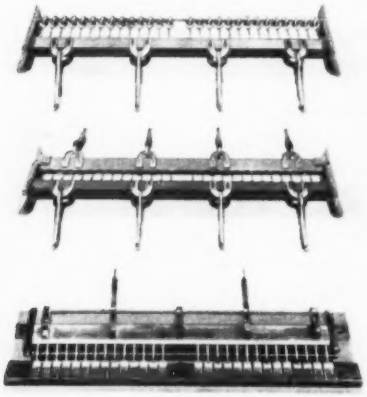
opment, as used on punch presses, counter balances the variable punch and die plates which vary from one setup to another, acts as a frictionless brake, and removes all the load from the clutch assembly at the time of disengagement.

Fixtures for holding parts being surface finished

A new group of jigs and fixtures for the mechanical holding of parts being surface finished has been introduced by Clair Mfg. Co., 1030 S. Union St., Olean, N. Y. Designed for use with Clair surface finishing machines, the group includes work holders and layout jigs. Primarily, they are used for holding items such as silverware, but they can be adopted for holding hand tools and other products.

Basically, the holding fixtures consist of: a framework for mounting in surface finishing machine, a clamping device for holding the items to be surface finished, and a provision for supporting heavy-ended items such as spoons.

Two types of construction may be employed. For heavy-duty operations where structural strength is of importance, they are made of steel-braced aluminum, with a weight of 15 lbs. When the need for minimum weight is



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Pictured above—No. PG-K-1030L—"Midget" collet die grinder.

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MALL TOOL COMPANY
7742 S. Chicago Ave., Chicago 19, Illinois

Send me the 1953 MALL Pneumatic Tool Catalog.

Name _____

Company _____

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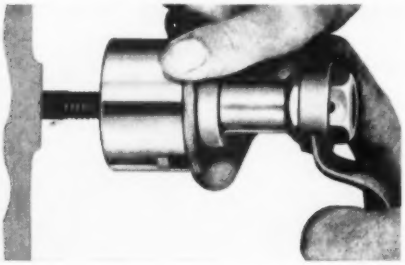
MU-31

a consideration, a steel-braced laminated plastic construction is used. This type weighs 10 lbs.

Universal type stud wrench

A stud wrench for industrial and automotive applications is said to combine large capacity, speed, and positive operation with economy. It is made by Clark-Feather Mfg. Co., Dept. BB, Fort



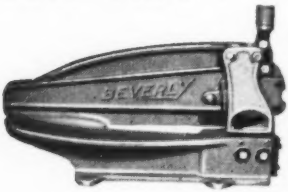
Morgan, Colo. Ratchet action is built in. The self-contained tool in two sizes handles any o.d. from ¼" through ¾", regardless of contour. SW-1, with capacity through ½", takes either internal ½" square, or external 1" hex drive. SW-2 takes 1¼" external hex drive and is hollow to accommodate any length stud. Its capacity is 17/32"—¾" inclusive. The over-all diameter of SW-1 is 2", permitting removal of studs only 1" apart because action is not eccentric. SW-2 is ½" larger.

Vacuum rhodium coating service

Serfass Corp., Dept. BB, 524 West Broad Street, Bethlehem, Pa., has announced that it is equipped to apply coatings of rhodium to non-conductive and conductive materials by using the vacuum technique. Rhodium is being applied on a commercial basis upon glass and other non-conductive substances to meet specifications of transmittancy and hardness. Rhodium is a material that has high resistance to chemical attack and because of its high reflectivity is excellent for mirrors and reflecting surfaces when they must withstand corrosive chemical atmospheres. Coating thicknesses can be applied to give controlled reflectivity or transmittancy within 5%.

Save Time . . . Labor . . . Materials with

BEVERLY metal cutting SHEARS



Inside SLOTTER

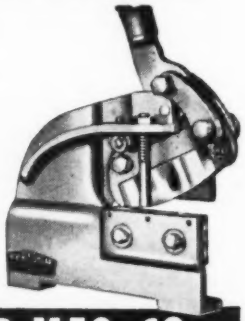
Makes cuts up to 8" inside edge of sheet. Sharp, clean burr-free cuts always assured. Cap. 16 ga. High strength aluminum alloy body; H.C.H.C. blades.

Throatless SHEAR

Make any cut—straight, irregular, curved. Exclusive design permits turning work any direction while cutting. 4 models—cap. to 3/16".

Slitting SHEAR

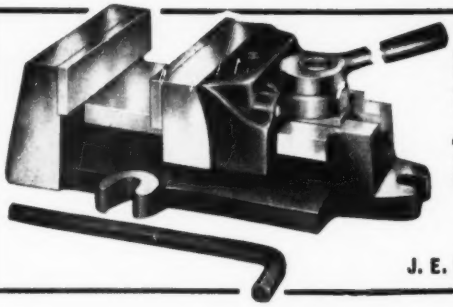
New "SS" Series—easier cutting with compounded linkage. 3 models — cap. to 3/16"; trimming capacity to 5/16" mild.



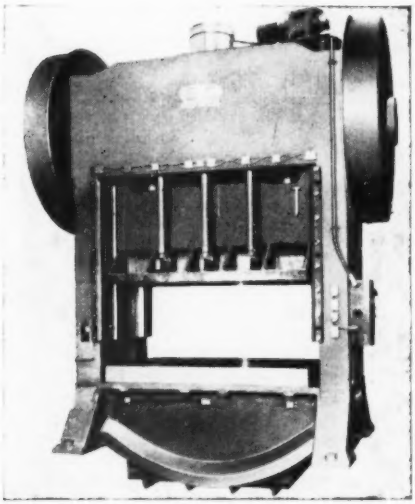
See your Beverly Distributor.
Write for FREE illustrated Bulletin.

Beverly SHEAR MFG. CO.

3005 W. 111th STREET • CHICAGO 43, ILLINOIS



Plunket Quick Action Vise
for DRILL PRESS or MILLING MACHINE
Designed for production work, using an eccentric motion to apply pressure to jaws. Eccentric motion moves jaws 5/16".
Size No. 7 — Net Price
6" jaws, 1½" deep, opens 4".....$83.16
Pressure between jaws, with handle furnished, 2200 lbs. Net weight 36 lbs.
Our complete line includes Vises for Drill Presses, Milling Machines, Shapers, Grinders
WRITE FOR CATALOG
J. E. Plunket Machine Co. 3230-32 Archer Ave. Chicago 8, Ill.



Cleveland double crank

The Cleveland straight sided double crank press is a double geared, twin drive equipped with two station electrically controlled air operated drum type clutch with spring loaded brake. It is made by The Cleveland Punch and Shear Works Co., Cleveland 14, Ohio. The press is designed with air counterbalance to the slide and the flywheel is provided with an auxiliary air brake to bring it to a quick stop when power is shut off. The bed of the press is arranged with a 91 ton pneumatic cushion in two units, with air manifold controls, so that cushions may be operated independently of each other. The press has a stroke of 16", 12" adjustment to the slide, 32" distance bed to slide, stroke up and adjustment down, 60" x 96" bed and slide area, and has a capacity of 525 tons. The gears run in a bath of oil and the drive is by multiple V belts from motor to flywheel.

du Mont "Minute Man" combination keyway broach kit widens range of usefulness

Said to meet a widespread demand for a keyway broach kit that covers all hole sizes not only in ⅛" but in

OUT WITH OLD BORING *and* FACING METHODS
NOW
Boring, Facing, Turning, Grooving, Undercutting—**All in One Toolhead.**
Re-Designed New Features
WRITE FOR DETAILS
CHANDLER TOOL COMPANY, Muncie, Ind.
COMBINED BORING & FACING TOOL HEADS
Chandler-Duplex

CAST IRON SURFACE PLATES

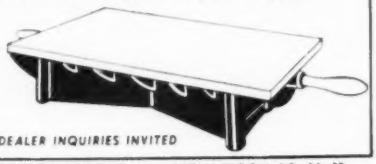
Made of High Quality SEMI-STEEL.

Precision Ground or Scraped to close tolerance for layout and assembly work.

Reinforced with heavy ribs. 3-point support.

Size	Approx. Shipping Weight	Ground Finish	Scraped Finish
12x12	40	$22.50	$42.50
12x18	60	27.50	62.50
18x24	100	79.50	112.50

F.O.B. N.Y.C. Prices Subject to Change without Notice



DEALER INQUIRIES INVITED

GRAND TOOL & SUPPLY CO. 176 GRAND STREET • NEW YORK 13, N. Y.

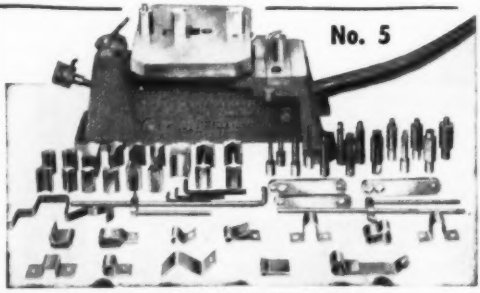
1/16" increments, the du Mont Corp., Dept. BB, Greenfield, Mass., introduces the No. 1-1A combination kit.

This kit provides broaches and bushings for standard width keyways in

eighteen bore diameters conforming to American key standards. By interchanging broaches and bushings thirty-six different combinations of keyways can be cut.

Shop tools

An extensive line of plastic and wood handle screwdrivers has been added to the wrenches and shop tools currently available from The Billings & Spencer Co., Dept. BB, Laurel St., Hartford, Conn. The new tools are drop forged from selected steel, heat treated and finished in accordance with rigid Billings specifications. Plastic handles are said to be shockproof, unbreakable and impervious to oil and water. A special six-flute design is said to provide a comfortable, non-slip grip. Blades are imbedded in the plastic in such a manner as to insure a tight fit and to prevent the blade from turning within the handle. Of special interest is a new heavy duty model known as the Billings wrench grip which is equipped with a hexagonal shoulder, directly below the plastic handle. This shoulder provides for the application of a wrench when increased torque is required.



MultiforM BENDER-CUTTER

CUTS, BENDS, PUNCHES

Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend and cut round or flat brass, bronze, aluminum, steel, etc., up to ⅜" x 1½" as illustrated, other models up to ¼" x 4".

J. A. RICHARDS CO.
KALAMAZOO, MICH.

WRITE FOR DESCRIPTIVE CIRCULAR

Piston gage

A new type piston gage manufactured by The Sheffield Corp., Dept. BB, Dayton 1, Ohio, is said to provide simultaneous gaging of piston skirt diameter at two places, of taper from top to bottom, and of the cam grind on the skirt at three points. In measuring

the diameter the Precisionaire also indicates in which one of eight classifications the piston belongs.

The gage consists of a chrome plated ring containing a number of air jets and two Sheffield "Plunjets" connected to a five column Precisionaire. This piston gage is a companion to the Sheffield automotive cylinder block bore gaging and classifying machine. Used together, they permit selective matching of pistons to bores during assembly.

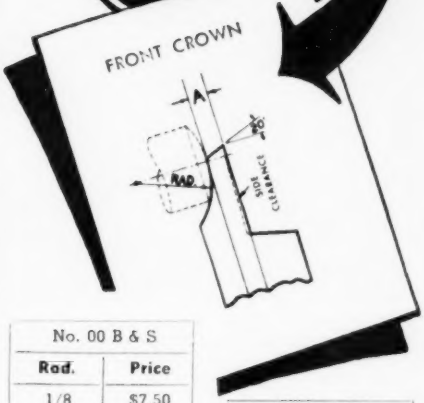
Colchester Saftilathe

The Colchester Lathe Co., Colchester, England, has just released for distribution in the United States through British Industries Corp., Dept. BB, 164 Duane Street, New York City, a new 12" x 24" all geared head engine lathe, manufactured to American lathe standard toolroom limits.

This machine is said to have a number of safety features, which make it ideal for training new labor or for

IMMEDIATE DELIVERY from Stock

RADIUS CUT-OFF TOOLS



No. 00 B & S	
Rad.	**Price**
1/8	$7.50
3/16	$7.50
1/4	$7.50
5/16	7.75
3/8	8.00
7/16	8.25
1/2	8.50

No. 0 B & S	
Rad.	**Price**
1/4	$ 8.50
5/16	8.50
3/8	8.50
7/16	9.00
1/2	9.50
9/16	10.00
5/8	10.50

ORDER BY RADIUS AND MACHINE SIZE

Other standard radius tools from Stock: Front Crown
Rear Crown
Radius (90°)

These H.S.S. tools assure uniform, correct radii, better finish and appearance, less set-up trouble and maximum production at lowest cost. Full line of standard tools also available. **SEND FOR LATEST PRICE LIST.**

SOMMA TOOL CO., INC.
21 BROWN ST. WATERBURY, CONN.

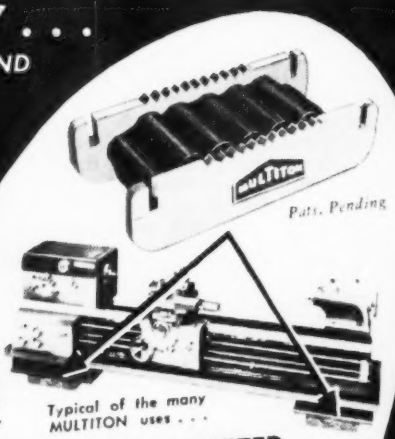
schools and automotive repair shops. Some of the features are large diameter spindle running on special SKF double row roller bearings bored 1-9/16" to pass 1½" bar having 1½" collet capacity, and the extremely heavy and rigid spindle nose, bed and saddle. The 1½ h.p. motor and 1400 lb. weight make this an extremely rugged and heavy duty lathe for this price class, which can be used both for heavy roughing cuts, and fine precision toolroom work.

Industrial X-ray unit is portable

A new Norelco portable industrial X-ray unit (MG 160), that fits into the trunk of an automobile and is designed specifically for rapid inspection of welds; pipe lines; power plant, ship and aircraft equipment, is available from the X-ray Department, Non-Destructive Testing Division, North American Philips Company, Inc., Dept. BB, 750 South Fulton Avenue, Mount Vernon, N.Y.

The new unit is unique since the X-ray tube head also contains the high tension generator of 150,000 volt output. It weighs only 143 lbs. The accompanying

A BETTER WAY . . .
TO MOVE MACHINERY AND HEAVY EQUIPMENT
THE MIGHTY
MULTITON
ROLLER SKID
LIGHT WEIGHT . . . EASILY STORED . . .
UNLIMITED CARRYING CAPACITY
EASILY HANDLED . . .



The first important advance in heavy equipment moving in years! MULTITON moves machinery and other heavy equipment easily — with great savings in labor. Just set tremendous loads on MULTITON and roll away.
Write for Bulletin B

Typical of the many MULTITON uses . . .

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95 MADISON AVE.
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Fast, Accurate Measurements
With the AMIC "Quick-Action"
Vernier Caliper

AT NEW LOW PRICES

The perfect tool for machine shop, tool room inspection and Quality Control. A flick of the thumb and you've got your external and internal dimensions. Knife-edged hardened jaws provide exact thread measurements. A depth gage blade gives speedy measurements. AMIC designed and made exclusively for AMIC by an outstanding European manufacturer.
Scientifically engineered, painstakingly machined, packed in a sturdy leatherette case. A tool without rival.
Size 6" No. 21B, Graduation 1/40", vernier reading .001.

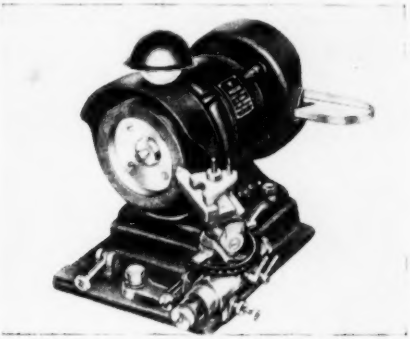
No. 22B, Graduation 1/40" and full MM, vernier reading .001 and 1/10 MM.
Write for Circular A. Dealer inquiries invited.

AMERICAN MEASURING INSTRUMENTS CORP.
AMIC BUILDING
21-25 44th Ave., Long Island City, N. Y.
TELEPHONE: EXeter 2-0002

control is equally compact and weighs only 80 lbs. The complete MG 160 equipment weighs only 223 lbs.

Prosser precision grinder

Thomas Prosser & Son, Dept. BB, 120 Wall St., New York, N.Y., has announced another new addition to its line—a moderate-priced precision grinder which it is claimed will produce perfect keen cutting edges and exact



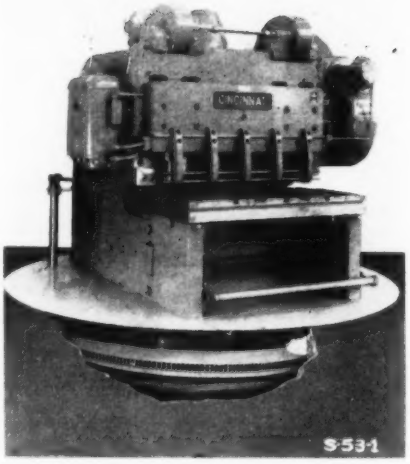
angles on all types of modern cutting tools, such as carbide, stellite, and high speed steel.

One side of the grinder is equipped with a quick-acting indexing table, which can be instantly set to the required angle, and which remains fixed

in position without need of locking devices. The tools can be rapidly rough-ground by hand on a vitrified wheel (or a diamond wheel if desired) to a slightly greater angle than the final finish angle, and then only a slight amount of grinding is necessary on the finishing wheel, using the precision reciprocating-action tool holder, to obtain exact angles, straight edges, and finish. The finishing wheel can be vitrified or diamond, as desired. Various accessories, for grinding radii, chip breakers, drills, etc., are available.

Shear cuts up to 1″ thick, 4′ long

The Cincinnati all steel shear manufactured by The Cincinnati Shaper Co., Dept. BB, Hopple, Garrard & Elam Sts., Cincinnati, Ohio, is said to be capable of cutting mild steel up to 1" thick and 4′ long. The shear is mounted on a turntable that is rotated by means of a circular rack and pinion. The shear is set at different positions to eliminate as much handling of large plates and



coiled stock as possible. It can be turned to 90 degrees either side of center.

The shear weighs 42,000 lbs. and op-

The "UTILITY"

MARKING OUTFIT

Nine sizes of type stamped with the same holder—furnished in sturdy wooden box—for all interchangeable marking.

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Mecco SAFETY MARKING TOOLS M.E.CUNNINGHAM CO.

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402 E. Slauson Ave., Los Angeles, Calif.

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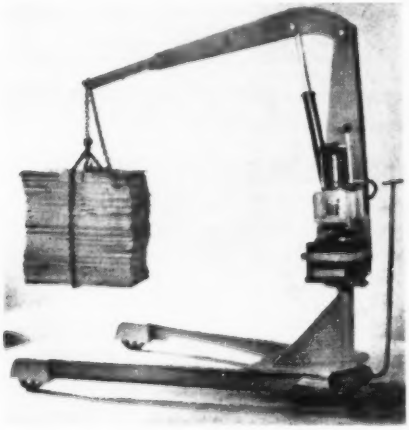
TOOL PROBLEM

Columbus Die-Tool has been solving tooling problems for over 45 years. Expert designers and builders of all types of tools and special machinery. Write us today!

COLUMBUS DIE-TOOL
and Machine Co.
P. O. BOX 750 • COLUMBUS, OHIO

erates at 30 strokes per minute. It is equipped with a hinged back gage angle that permits the cutting of plates longer than the back gage range.

Additional features are a light beam shearing gage, ball transfers in the table, and air counterbalances on the ram.



Electrical power unit

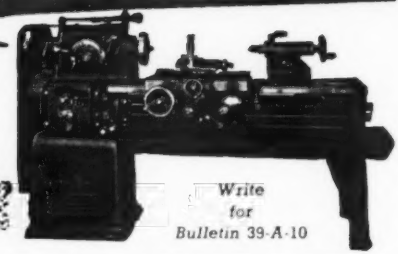
Star Machine and Tool Co., Dept. BB., 201 Southeast Sixth St., Minneapolis, manufacturers for the past 27 years of brake lining and riveting equipment and for the past two years producers of combination Hydro-lift truck and shop cranes, has now developed and is producing an optional attachment for electrical operation of its Hydro-lift combination crane.

This new electrical power unit makes operation of the lift three times faster than hand operation. Electrical operation of the crane is simple; just move the handle forward and the power unit raises any load up to 2,000 pounds without any effort by the operator. To lower the load, just move the handle back.

Power for the unit is supplied by a standard 6-volt automotive battery which will be kept charged by the truck engine or recharged by a quick recharger.

CARROLL and JAMIESON

- 16" Lathe
- 12 Speed Geared Head
- Motor Drive Timken Mounted Spindle
- Modern Design
- Liberal Dimensions



Carroll & Jamieson Machine Tool Co.
BATAVIA, OHIO, U.S.A.

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GATCo ROTARY BUSHINGS

FOR DRILLING, CORE DRILLING ROUGH AND FINISHED BORING

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work—or both.
Eliminates expensive tool construction—Reduces tool wear—Prevents seizure and pilot breakage—Especially adapted where precision is required.

Write for full information and prices

GATCO ROTARY BUSHING CO.
42330 Ann Arbor Road U. S. 12
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You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

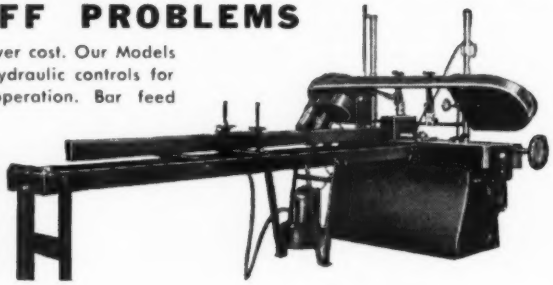
IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money too!

HEIMANN MFG., CO. ● URBANA, OHIO

SOLVE CUT-OFF PROBLEMS

Do a REAL job—faster and at lower cost. Our Models M, D, and J feature simplified hydraulic controls for both full and semi-automatic operation. Bar feed (shown here on Model M), other accessories, and hinge-type saws also available. Write for literature.



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THREE RIVERS, MICH.

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SAVE UP TO 85%
NEW
INSIDE – OUTSIDE
VERNIER CALIPERS
German made by one of Europe's leading specialists in precision tools. Measures inside-outside & depth in .001" to 6" in 1000ths and 1/10mm to 150mm in 10ths. 9.75
MICROMETERS – 0" to 1" in 1,000ths. 9.75
Has lock-nut & ratchet ...ONLY – . . .
STAND MAGNIFIER
Handy stand magnifier with universal adjustments. Overall height 6". Has powerful, clear magnifying lens. 1.99
BENDIX HYDRAULIC
PUMP & MOTOR
Has 3-1/2 GPM capacity at 600 PSI. Motor is 1½ HP, 24V, D.C. Will operate on either 12 or 32V, DC current. Has built-in relief valve adj. to 1500 PSI. This unit ideal for hyd. lifts, portable loaders, etc. 19.50
MAGNETIC BASE–INDICATOR HOLDER . . .
A time saver for precision checking. Magnetic base fits curved or flat surface. Has 45-50 lb. pull. Stainless steel 6½" rod mounted in ball socket permits universal settings . . 3.95
Note: We have complete line of instruments, depth gauges, inspection mirrors, etc.
WRITE TODAY
HYDRAULIC HAND PUMP
Operating pressure 2000 PSI. Cap., 1.5 cu. in per complete cycle . . 12.75
GEAR HEAD MOTORS
Heavy duty, G.E. Gear Head motor. 2 HP, 24V. DC, 125 amp., reversible motor drives a reduction gear unit giving 36 to 1 ratio at take-off. Also will operate on 6 or 12 volts.
MOTOR ALONE 9.95
GEAR BOX 7.95
36 to 1 G.E. (306 shaft RPM)
28 to 1 Eclipse (130 shaft RPM)
40 to 1 Eclipse (110 shaft RPM)
10.95 EA.
HYDRAULIC ACCUMULATORS
A-28 FLOATING PISTON TYPE – 4"x 18"
Built to stand 2,000 PSI 12.75
A-5 VICKERS – 10" dia. Ball type. Built to stand 2000 P.S.I. 24.75
ELECTRIC ACTUATORS
Hundreds of uses for any mechanical device needing controlled 2 way action. Opens, closes, raises or lowers doors – windows – gates – valves.
CTU-2 – Foote Linear Actuator – 24 volt, DC, 8500 RPM, 1/6 HP – series wound motor. 4½" stroke in 13½ sec. Compression and tension loads up to 750 lbs. Adjustable micro switch for limits of travel. Overall lngth., retracted 11" 7.95
We also carry many more sizes and types of Actuators. Write today for information.
HYDRAULIC CYLINDERS
Gives 20,000 lbs. thrust (push or pull) using 1500 PSI line pressure as obtained from our hydraulic pumps. Will produce up to 40,000 lbs. thrust with 3000 PSI. Can also be used on low pressure air systems. 4" bore, 18" stroke, 30½" length. Ideal for road form – shop machinery.
No. 3 HYDRAULIC CYLINDER
Double action. Bore is 1" – Shaft ½". Has stroke of 2½" to 4". Stroke can be adjusted with internal sleeve stops. Overall length is 8½". Will take 1500 lbs. continuous duty. 3000 lbs. intermittent. Will lift or push up to 1100 lbs. 5.75
We stock over 50,000 Hydraulic Cylinders, Valves, Pumps, Accumulators, Hand Pumps, Motors, Hose, etc. All at Money Saving Prices.
230 Pg. CATALOG
Amazing Values! 1000's of items for Mfgr., Mechanic, Sportsman, etc. Save on Machine Tools, Hydraulics, Pumps, Valves, Hand & Power Tools, Instruments, etc. Send for your copy today!
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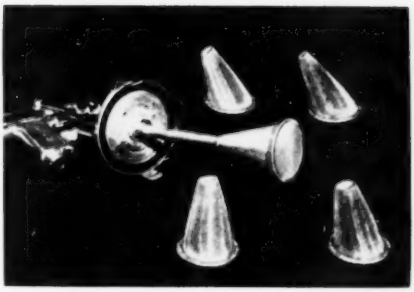
Dept. MTB-8
LOS ANGELES 58, CALIF.
Order from this ad. Pay by M.O. or check. P.O's. accptd from D&B firms. ½ deposit with C.O.D's.
All Prices F.O.B. Los Angeles

Strainer for sprayers

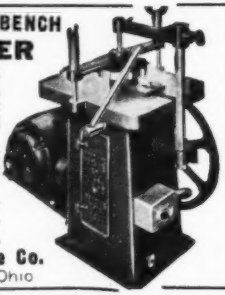
A fine gage brass screen strainer for paint spray which eliminates slugs, clogging and spitting is announced by Clear-flo Strainer Co., Dept. BB, 8050 35th Ave., N.E., Seattle, Wash.



There are four different sizes of Clear-flo strainers to fit various makes of spray guns. One of its outstanding features is that it is self-cleaning.

DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature
WATTS BROS. TOOL WORKS
Wilmerding, Pa.

READING BENCH KEYSEATER
Portable — move directly to job; a time saver for both small and large shops.
3¾" stroke; adaptable for other work.
Low first cost—prompt delivery.
Good dealers wanted.
Reading Machine Co.
Cincinnati 37, Ohio



"Ateco" Gage Handles C.R.S. Aluminum and

TAPERLOCK IN EIGHT SIZES
TRILOCK IN FOUR SIZES
Prompt Shipment from Stock
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CORPORATION
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SCHERR MAGNI-RAY
The Illuminated MAGNIFIER for PRECISION INSPECTION
Oblique rays make scratches and defects stand out clearly.
Genuine optical glass lenses.
Heavy adjustable base.
Removable lens housing for inspection of large surfaces, engines, etc..
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200-MT LAFAYETTE STREET • N. Y. 12, N. Y.

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CLE-ARC-UTT BORING BAR and BIT
Angle of cutting edge can be varied to proper angle. Tool is always in Centerline level. Saves time and money. Made in ½" and ¾" sizes. High speed and carbide steels. Write today for full details.

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DWIGHT, ILLINOIS

JIG BORING
Done to your specifications
We Have 12 Jig Borers Including the largest Pratt & Whitney Made
BLOOMFIELD TOOL CORPORATION
36 Farrand St. Bloomfield, N.J.

DANNEMAN Precision DIE-SETS
Precision-Bored on Master Plates

DANNEMAN DIE-SET DIVISION
ACME-DANNEMAN COMPANY, Inc.
201 Lafayette St. New York 12, N. Y.
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SEND FOR FREE CATALOG TODAY

T-NUT & STUD SETS
STEP BLOCK SETS
PUNCH PRESS SETS

QUARTER TURN SCREWS
SHOULDER SCREWS
DOUBLE END JIG FEET
SCREW TYPE JIG FEET
PRESS TYPE JIG FEET
FLANGED NUTS
CUT THREAD STUDS
TEE-NUTS
COUPLING NUTS
ADJUSTABLE STEP BLOCKS
STAR TYPE HAND KNOBS
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KNURLED HEAD SCREWS

Northwestern
118 HOLLIER AVE., DAYTON 3, OHIO

The MARKET PLACE

Advertisements acceptable in THE MARKET PLACE include those for employment, sales services, production facilities, representation and related needs. **Rates: $12 per column inch per insertion. Maximum size advertisement accepted in this section is two inches.**

Copy should reach us by the first of the month for next month's issue.

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IMPORTED PRECISION TOOLS

Vernier Calipers up to 80" - Height gages up to 48" at savings up to 40% to the user and excellent proposition for dealers.

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Making EXTRA Power for the size of the Press.
Also Everything in Precision Measuring Tools.

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Masters —**3613 ARCHER** **CHICAGO 9, ILL.**

CROZIER EXTRACTOR SETS

for pulling bushings & bearings from blind holes
Will pull up to 5 ton press fit in minutes
Designed for and used by U. S. Navy
Complete Set ½" to 2"
with carrying case

Regularly $150

SPECIALLY PRICED $105
delivered

Limited Supply — Order Now!

JOHN REINER & CO.
12-12 37th Ave. Long Island City 1, N.Y.

END MILLS RESHARPENED
1 WEEK DELIVERY

Any size—O.D. and End 75c each
Send parcel post to
UNIVERSAL CUTTER SERVICE
11 Meadow St. New Britain, Conn.

MOLDS ALUMINUM
We make all types
HANDLED & HINGED

Fast operating for low melting point metals.
Work guaranteed—Quick service—Bank references—
Established 10 years. Send for quotations.
No obligation.

E. L. SWEET & SON Tonawanda 33, N. Y.

WANTED

Manufacturers' representatives wanted to sell granite & steel surface plates, angle plates, parallels, etc. All territories.

Address replies to Box 183,
c/o BLUE BOOK, Wheaton, Ill.

REPRESENTATION WANTED

By 2 Sales Engineers selling Metropolitan New York and New Jersey. Specialists in production cutting, tool room equipment and accessories. Excellent machine shop contacts. Thorough coverage guaranteed. Want exclusive line.

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c/o MACHINE & TOOL BLUE BOOK
WHEATON, ILLINOIS

The world's best . . . one-piece, drop-forged—not welded—of mild carbon steel, heat-treated, with head accurately milled for standard tables on lathes, planers, boring mills, milling machines. Integral washer and nut. Sizes: up to 30". Typical direct prices for 10" lengths: ½—$1.36; ⅝—$1.38; ¾—$1.58; ⅞—$1.89 Write for price list.

THE O K TOOL COMPANY
MILFORD 7, NEW HAMPSHIRE

DI-TRU

For Greater Efficiency and Better Grinding Results Have *DI-TRU* Reset Your Worn Diamond Tools.

• Same Day Service •
$1.00 Per Reset

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WANTED

MANUFACTURER'S REPRESENTATIVES

For nationally advertised line of precision measuring tools and instruments, diamond wheels and precision diamond cutting and form tools. Exclusive territories.

Write P.O. Box 185
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Wheaton, Ill.

For 30 Years— **EXPERTS**

Represented nationally in principal cities.

DAYTON ROGERS
Manufacturing Company

MINNEAPOLIS 7, MINNESOTA

WANTED
A Distinctive Product

Our client, an established New England manufacturer, wants to add one or more products selling through same channels as present line; will be interested in

1. **Small machine tools, such as milling machines or tool grinders.**
2. **Accessories for machine tools, such as drill attachments, drill heads, dividing heads or adjustable angle plates**

Market acceptance established, sales potential $500,000 a year and up.

Please write referring to advertisement No. 55. Brokers protected.
We are compensated by our client.

WELLING & WOODARD, INC.
52 Vanderbilt Ave. New York 17, N.Y.
CONSULTANTS IN DIVERSIFICATION AND NEW PRODUCTS

SALES OPPORTUNITY! Specialty Tool Representatives and Mill Supply Distributors wanted to represent fast selling machine tool item, selling direct to industrial users. Increased machine shop activity makes this item a sure-shot sales and profit opportunity.

Write or Wire Box 181
MACHINE and TOOL BLUE BOOK
WHEATON, ILLINOIS

CONNECTICUT REPRESENTATION

Aggressive mill supply and machine tool salesman (with following) wants a real live item to which he can devote major portion of effort.

Direct to industrial accounts in BRIDGEPORT, CONN. district or will contact distribution in entire state depending on product and your needs. What have you?

Box 173
c/o MACHINE and TOOL BLUE BOOK
Wheaton, Ill.

LINE WANTED FOR CHICAGO TERRITORY

Well-established representative desires line used by the tool and die industry, metal working, grinding or plastic industry, where we now have customers of long standing. Write fully giving details.

Box 177
c/o MACHINE & TOOL BLUE BOOK
Wheaton, Illinois

DISTRIBUTORS!!

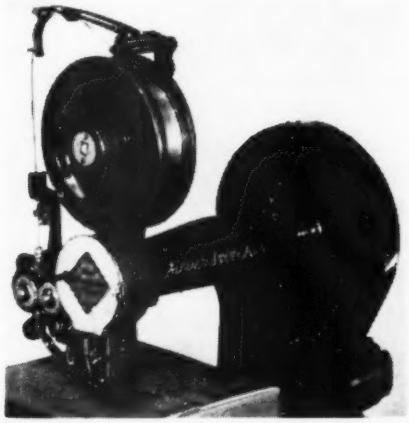
Distributors wanted for the sale of a new process for increasing the life of sintered carbide. Many desirable exclusive territories still open. Write giving full particulars including lines carried, number of salesmen employed and area covered, to—

BOX 175
c/o MACHINE & TOOL BLUE BOOK
222 E. Willow Ave. Wheaton, Ill.

A typical civil defense first aid station would require two doctors, three dentists, three nurses, two pharmacists, 15 trained first aid workers, six clerical assistants, four ambulance workers, four drivers, and 150 litter bearers. A ring of 57 such stations should be set up 1-1/2 miles from the center of each A-bomb blast, with 39 additional units forming a second ring at a distance of two miles.

Acme Steel introduces new wire stitching method

Arcuate wire stitching, new carton stitching method introduced by Acme Steel Co., Dept. BB, 2821 Archer Ave., Chicago 8, Ill., is said to use regular flat stitching wire, putting an arc into it prior to the stitch-forming operation,

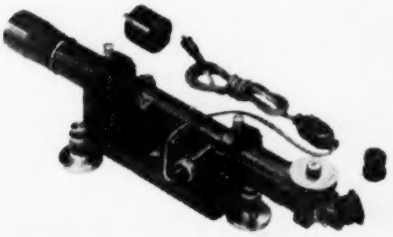


then driving and clinching the stitch at higher speeds. Arcuate wire stitches are claimed to be stronger, lighter, and practically buckle free.

Auto-Collimator tests to .0000025" per inch

The improved Microptic Auto-Collimator is said to be an instrument for measurement of flatness of surface plates, more accurate than conventional means permit. It is made by Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill.

The instrument is best understood as the equivalent of an independent super-precision level free from the effects of temperature change, normal shop vibration, or wear. It will give readings comparable to a level of forty times the normal accuracy and in any plane—



horizontal, vertical, or inclined. With the use of an optical right-angle accessory, checks can be made in a direction perpendicular to its own axis.

MECHANICS through the AGES

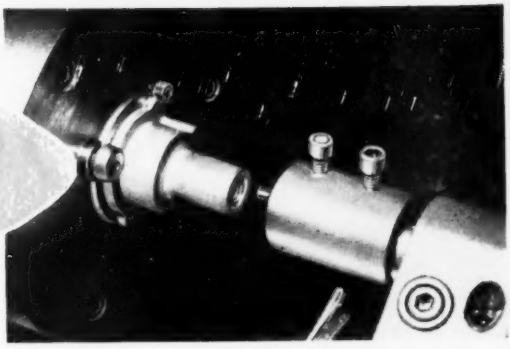
ONE of THE WORLD'S EARLIEST LOCOMOTIVE

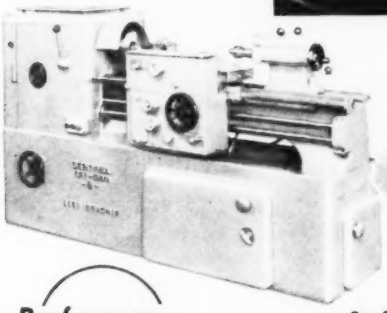
ENGINES, BUILT BY TREVITHICK OF ENGLAND IN 1804, WAS DESIGNED TO PUMP WATER IN ONE PLACE, OPERATE A HAMMER IN ANOTHER, WIND COAL IN A THIRD LOCATION— AND TO TRANSPORT ITSELF FROM JOB TO JOB, HAULING WAGONS LOADED WITH THE COAL IT NEEDED TO OPERATE!

In the Early 1840's **CHAUNCEY JEROME** OF NEW ENGLAND, USING THE INTERCHANGEABLE SYSTEM OF MANUFACTURE, TURNED OUT ONE-DAY BRASS CLOCKS AT ONE FIFTH FORMER COSTS . . . INDEED THE VALUATION HE PLACED ON CLOCKS SHIPPED TO ENGLAND WAS SO LOW THAT BRITISH AUTHORITIES, THINKING HE HAD DELIBERATELY UNDERVALUED MERCHANDISE TO REDUCE IMPORT DUTY, "PUNISHED" HIM BY SENDING HIM A CHECK FOR THE FULL AMOUNT!

THE **FIRST ENGINEER** TO DEPICT MACHINE DETAILS IN ORTHOGRAPHIC PROJECTION WAS SOLOMON DE CLAUS WHO IN 1615, FIRST USED WORKING DRAWINGS SHOWING ELEVATION AND CROSS-SECTION. BEFORE HIS TIME, DESIGNERS PICTURED THEIR EQUIPMENT IN PERSPECTIVE ONLY.

SMALL PART....





BIG SAVINGS

Performance Data

Material	Die cast aluminum
Thread produced	5/8"-18 UNF 2B internal
Thread length	3/8" full thread
Depth C'bore for thrd.	7/16"
RPM	2000
Number passes req'd	8
Type tool	Carbide
Approx. pcs per grind	7500
Cutting time	8 seconds
Floor to floor time	15 seconds

*name on request

with the CRI-DAN "B"

SINGLE POINT THREADING MACHINE

Again, the Cri-Dan Threading Machine proves its amazing efficiency.

This small aluminum casting, formerly threaded on a tapping machine, was set up on the Cri-Dan "B". The finished casting required a 5/8"-18 class 2B internal thread cut to within 1/16" of the shoulder. When the Cri-Dan "took over," the scrap loss due to concentricity was completely eliminated, thread depth was consistently maintained and overall production increased.

This case history of a leading manufacturing company* proves again that your Lees-Bradner representative can help increase your savings on threading operations. Contact him today.

the LEES-BRADNER® Company

CLEVELAND 11, OHIO, U.S.A.

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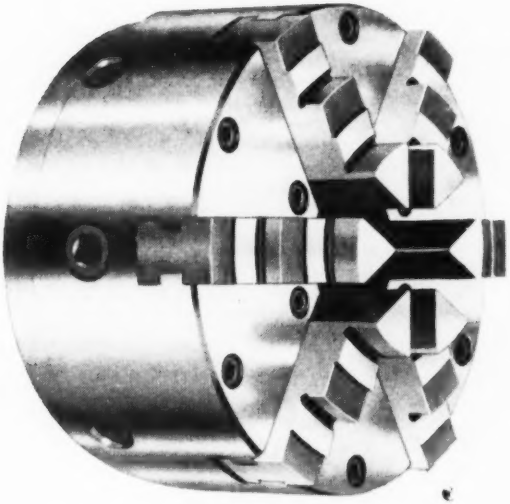
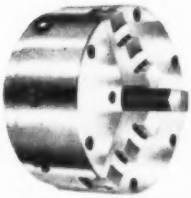


NEW 9"

Buck AJUST-TRU CHUCKS

It's Ready For You...

6 JAWS



OR 3 JAWS

External and internal, in 4", 5", 6", 7½" — and now 9" — chuck diameters.

Now there's a 9" Buck Ajust-Tru chuck, which many manufacturers asked to be produced.

Its jaws hold work from ¼" to 8" outside diameter.

It adjusts to within .0005" much quicker than any other chuck — *holds* that precision on duplicate parts with *scroll chuck re-chucking speed.*

There's nothing like it — *anyplace* — for saving you money in the tool room, or on production. Send for catalog with complete details.

BUCK TOOL COMPANY

812 Schippers Lane • Kalamazoo, Michigan

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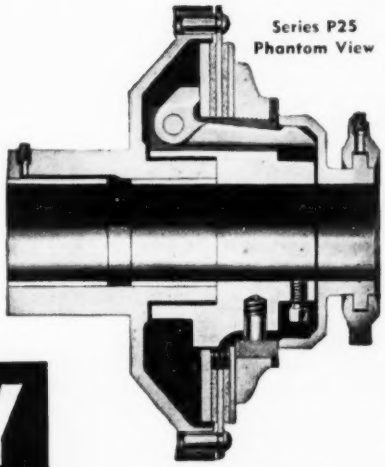

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1105 Marshall St. Cincinnati 25 ,Ohio

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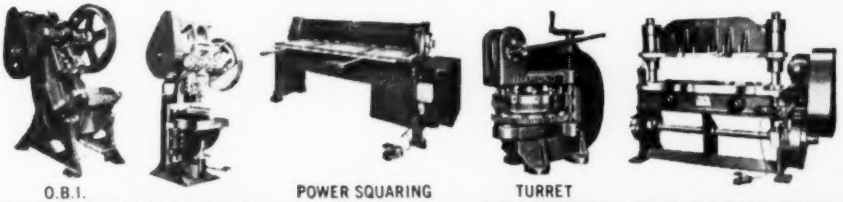

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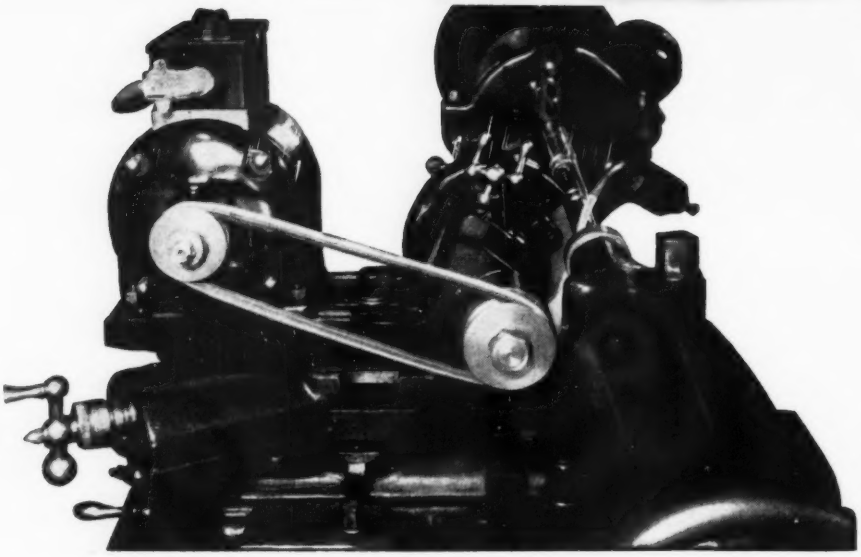

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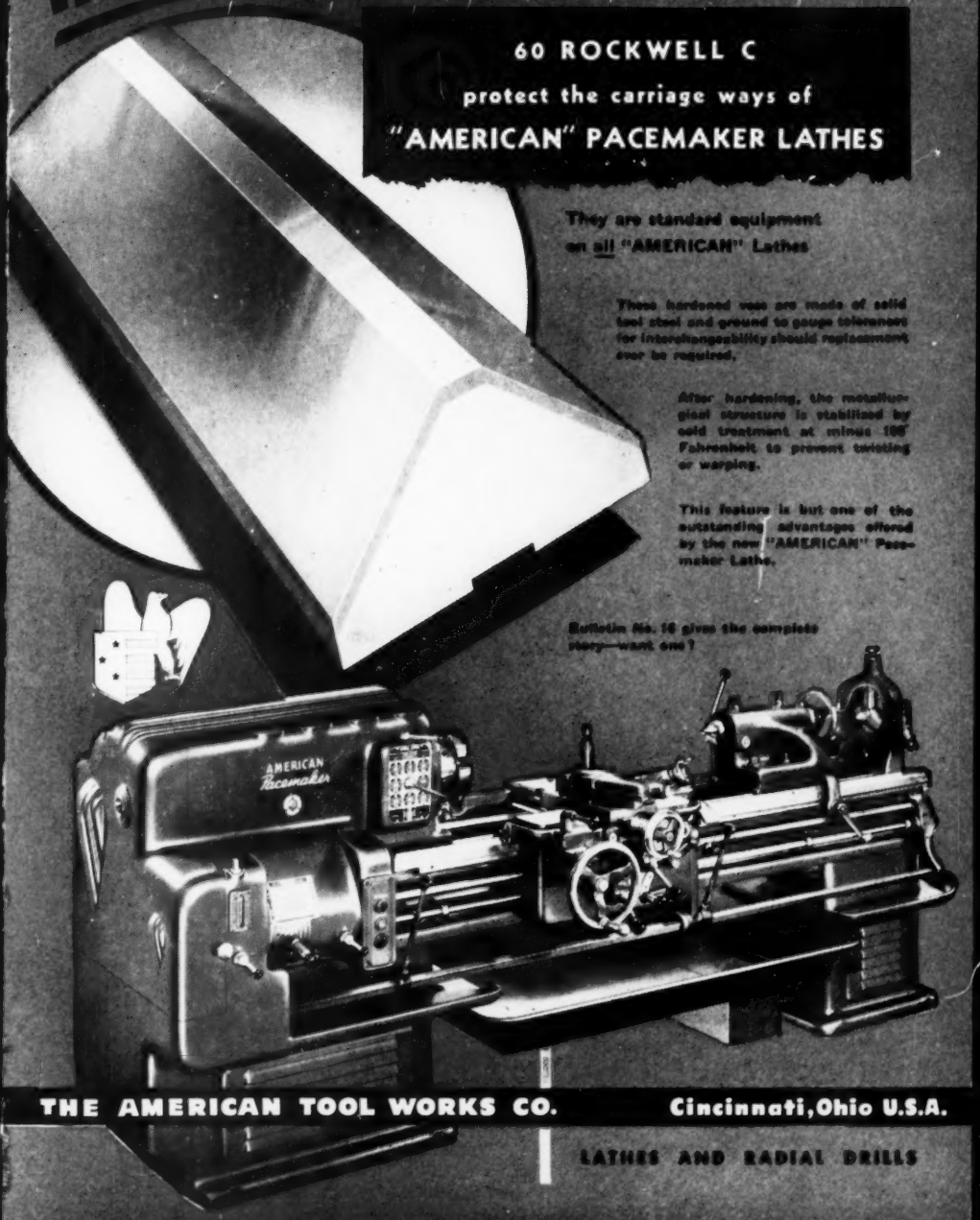

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